

COSMED does not assume any liability for end user interpretation of this user manual or for casual or consequential damages in connection with the provision, representation or use of this documentation.

No parts of this manual may be reproduced or transmitted in any form without the expressed written permission of COSMED Srl.

Fitmate User manual, XIII Edition

05/2012

Copyright © 2005-2010 COSMED

COSMED Srl - Italy

<http://www.cosmed.com>

<http://www.fitmate.net>

Part N. C02874-02-91

Table of contents

Table of contents	3
Getting started.....	13
Important notes	14
▶ Intended use.....	14
▶ Warnings	14
▶ Contraindications for Exercise testing.....	15
Absolute contraindications	15
Relative contraindications	15
▶ Environmental conditions	16
EMC.....	17
How to use this manual	20
▶ Conventions.....	20
Typographical conventions	20
Graphical conventions	20
Introducing Fitmate	21
▶ Description of Fitmate	21
▶ Fitmate Unit.....	21
The display	21
The Keyboard	22
The printer	22
The rear panel.....	22
▶ Battery Charger	22
▶ Reader and Mask.....	22
▶ Paper mouthpieces	23
▶ Soft mouthpieces.....	23
▶ Antibacterial filters	24
▶ Nose clips	24
▶ The HR probe.....	24
▶ The oximeter	24
▶ The canopy	25
The canopy hood with veil	25
Canopy blower and unit.....	25
Reading the results	27
Data presentation and values	28
▶ Data presentation.....	28
Values	28
Rank	28
Horizontal bar	29
Classes.....	29

Additional statements	29
-----------------------------	----

Installation 31

Before starting 32

▶ Checking the contents of the package	32
Fitmate standard packaging	32
Fitmate Pro standard packaging.....	32
Fitmate Med standard packaging.....	33
Fitmate GS standard packaging.....	33
Canopy module (option for Fitmate, Fitmate PRO, Fitmate MED).....	33
▶ Minimum PC configuration	34
▶ Power plug replacement	34
▶ O₂ sensor installation	34
▶ Product registration	34
Activating the Fitmate Unit	34
PC Software Registration.....	35
For more information contact.....	35
Claims and suggestions	35
▶ Charging the batteries	35

Connecting the Fitmate to a PC.....37

Connecting the Fitmate to an ergometer 38

Interface Fitmate Med with an external ecg 39

Fitmate Operation 41

User interface 42

▶ Powering the unit on/off	42
▶ Menus	42
How to enter the menus	42
▶ Keyboard	42
Functioning principles of the keyboard.....	43
▶ Acoustic signals	43

The main menu and the toolbar.....44

Archive management.....45

▶ Entering a new subject	45
▶ View/Search for a subject in the archive	45
▶ Deleting a subject from the archive	46
▶ Displaying a test in the archive	46
▶ Data editing	47
▶ Entering the test menu	47

Options 48

▶ Settings	48
▶ Printout settings	48
▶ RMR	49
▶ Advanced	49
▶ Restore factory settings	50
▶ Activate Fitmate	50
▶ Training zones settings (only Fitmate Pro/Med)	50
Fitness training zones	50
Rehabilitation training zones (Fitmate Med only).....	51

Elite training zones (Fitmate Pro only).....	51
▶ Customize protocols (only Fitmate Pro/Med)	52
The RMR test with face mask	54
▶ Setting-up and RMR test	54
Preparing the Fitmate.....	54
Preparing the Subject	54
▶ Test execution	55
Automatic detection of the start/end of the test.....	57
Problems during the test execution	57
Average interval selection	58
▶ Printout interpretation	59
The RMR test with Canopy	60
▶ Warnings and recommendations	60
▶ Setting-up and RMR test	60
Preparing the Fitmate.....	60
Warnings on batteries	62
Preparing the Subject	62
▶ Test execution	63
Summary on test execution.....	66
Automatic detection of the start/end of the test.....	67
Problems during the test execution	67
Average interval selection	68
▶ Printout interpretation	68
Body composition	70
▶ Test execution and data entry	70
Case A: The percentage of FAT is unknown and/or it is necessary to measure it	70
Case B: the percentage of FAT is known.....	70
Viewing the results	70
Standard measurement	72
▶ Performing the measurement and entering the data	72
Energy balance	73
▶ Setting up an energy balance	73
RMR	73
Lifestyle.....	73
Exercise	75
Goals	75
Viewing the program	76
Cardiorespiratory Fitness (Fitmate Pro/Med only)	77
▶ Setting-up of a Cardio-Respiratory fitness test	77
Fitmate Preparation.....	77
Subject preparation	77
▶ Performing a VO₂max test	79
Initialization of the unit	79
Starting the test	80
Test Execution.....	80
Canceling the test	82
To end a test	82
How to calculate the anaerobic threshold	82
▶ Printout interpretation	84

▶ Performing a “field test”	85
Muscular Fitness (Fitmate Pro only)	86
▶ Test execution and data entry	86
Evaluation of flexibility (Fitmate Pro only)	87
▶ Test execution and data entry	87
Energy expenditure during exercise (Fitmate Pro only)	88
▶ Set-up	88
▶ Perform a test	88
Initialization of the unit	88
Start of the test	88
Cancel the test	90
To end a test	90
▶ Printout interpretation	90
Spirometry test (Fitmate Med only)	91
▶ Contraindications for the performing spirometry	91
Absolute contraindications	91
Relative contraindications	91
▶ Contraindications for Bronchial Provocation testing	91
Absolute contraindications	91
Relative contraindications	91
▶ General warnings	91
▶ Patient preparation	92
▶ Forced Vital Capacity (pre)	92
Performing the test	93
▶ Slow Vital Capacity	93
Performing the test	93
▶ Maximum Voluntary Ventilation	94
Performing the test	94
▶ Bronchodilator test	94
Performing the test	94
Oximetry test (Fitmate Med only, option)	96
▶ Patient preparation	96
▶ General warnings	96
▶ The oximetry test	96
▶ Performing the test	96
Risk analysis (Fitmate Med only)	97
▶ European risk	97
▶ Frammingham CHD	97
▶ Duke Treadmill Score	98
▶ Bode Index	99
How to load paper in the printer compartment	100
▶ Test printout	100
Additional functions of Fitmate	101
▶ Flowmeter calibration	101
▶ O ₂ analyzer check	101
▶ Control panel	102
▶ LCD contrast	102
▶ Paper feed	102
▶ Erase memory	103

▶ Ergomanager	103
▶ Information	104
Advanced operations.....	105
▶ Reset Fitmate.....	105
▶ Format the memory.....	105
▶ Firmware update	105

Maintenance..... 107

System maintenance	108
--------------------------	-----

Calibrating flows and volumes.....	109
------------------------------------	-----

Cleaning and disinfecting.....	111
--------------------------------	-----

▶ Prevention of infection transmission	111
Transmission to technicians.....	111
Cross-contamination.....	111
Tuberculosis	111
Haemoptysis and oral lesions	111
Other known transmissible infectious diseases.....	111
Disposable in-line filters	111
▶ Other precautions and warnings.....	111
▶ Introduction.....	112
▶ Cleaning.....	112
Cleaning Agents/supplies.....	112
Standard cleaning procedure.....	112
▶ Disinfection	113
Preparing the disinfecting solution	113
▶ The turbine flowmeter.....	113
Cleaning the turbine	113
Disinfecting the turbine	113
Disinfecting the turbine (for Canopy option).....	114
Precautions to take when cleaning, disinfecting and drying the turbine	114
▶ VO₂max mask and mixing chamber mask	114
Disassembling the mask.....	114
Cleaning the mask.....	114
Disinfecting the mask.....	114
Sterilizing the mask.....	115
Reassembling the mask and components	115
▶ Cleaning the headcap assembly	116
▶ Cleaning and disinfecting the RMR canopy hood and veil (option)	116
Cleaning hood and veil.....	116
Disinfecting hood and veil	116

Sampling line maintenance (Permapure).....	117
--	-----

Inspections	118
-------------------	-----

O ₂ Sensor installation and replacement	119
--	-----

▶ Installation.....	119
▶ Replacement.....	120

Troubleshooting	121
-----------------------	-----

Installation and Activation of Software 137

Installation of software	138
--------------------------------	-----

▶ Installation of software	138
▶ Installation of the Fitmate USB driver	141
Windows XP	141
Windows Vista/Windows 7	142
▶ Installation of the Lifecorder Plus Activity Monitor USB driver	142
Windows XP	142
Windows Vista/Windows 7	142
▶ Verify the proper installation of the USB drivers	142
Windows XP	142
Windows Vista	143
▶ Installing and using shared archives	143
▶ Run the software	144
Activation of SW	145

User Interface and settings 147

User Interface	148
▶ Display	148
▶ Tool bar.....	148
Show/hide the toolbar	148
▶ Dialog windows.....	148
Use of the keyboard	148
Use of the mouse	148
▶ Scroll bars	149
▶ Help on line.....	149
Tips	149
▶ Version of the program	149
Settings.....	150
▶ Configuration	150
Setup	150
Archive.....	151
▶ Language of the software.....	151
▶ Change Fitmate language (unit)	151
▶ Printout Header	152
▶ Pdf file name	152

Software features 153

Subject archive management.....	154
▶ Enter a new subject in the archive	154
▶ Select an existing subject	155
▶ Modify the data of an existing subject	155
▶ Delete a subject from the archive	155
Testing session manager	156
▶ Create a new session.....	156
▶ Open an existing testing session	156
Managing test results	159
▶ Show and modify the test results of a session.....	159
▶ Show a trend.....	159
Download tests from Fitmate unit	160
Test printout.....	162

▶ Printer set up	162
▶ Print preview	162
▶ Print test results	162
Export/import tests	163
▶ Export tests.....	163
▶ Export RMR and Caridiorespiratory Fitness Tests in text format (*.txt)	163
▶ Import tests	163
Other software features	164
▶ Archive Management	164
Reorganizing the archive	164
Erase the archive	164
Backup and restore archive	164
▶ Send subject card to the unit	164
▶ Wizard	164
▶ Documentation.....	164
Performing tests with the PC Software	165
Subject preliminary assessment	166
▶ Par-Q	166
▶ AHA/ACC CHD Risk	166
▶ Duke Treadmill score (Fitmate Med only)	167
▶ European CVD Risk (Fitmate Med only)	167
▶ BODE Index (Fitmate Med only).....	168
▶ Risks Summary.....	168
Standard measurements	170
Nutritional assessment.....	171
▶ Body composition	171
Case A: the percentage of FAT is known.....	171
Case B: The percentage of Fat is unknown and it is required its measurement	171
Test results display	172
▶ Resting metabolic rate	172
▶ Energy balance	173
RMR	173
Lifestyle.....	174
Exercise	176
Goals	177
Visualization of the results.....	178
▶ Weekly diet planner	179
▶ Activity monitor.....	181
Initialize the Activity Monitor	182
Read data from the Activity Monitor.....	182
Cardiorespiratory Fitness (Fitmate Pro/Med only)	184
▶ Execute a VO ₂ max test.....	184
Muscular Fitness (Fitmate Pro only)	186
▶ Test execution and data entry	186
Flexibility Assessment (Fitmate Pro only)	187
▶ Test execution and data entry	187
Fitness goals	188
▶ Set the goal to reach.....	188

Exercise prescription (Fitmate Pro only)	190
▶ Prescribing an exercise program	190
Appendix	193
Conformity declaration	194
Service - Warranty	195
▶ Warranty and limitation of liability	195
▶ Return goods policy for warranty or non warranty repair	195
▶ Repair Service Policy	195
Fitmate Registration Form	197
Privacy Information	198
▶ Personal data treatment and purposes	198
▶ How your personal data are treated	198
▶ The consent is optional, but...	198
▶ Holder of the treatment	198
▶ Customer rights	198
Waste of electrical and electronic equipment	199
Safety and conformity	200
Safety	200
EMC	200
Quality Assurance	200
Medical Device Directive (CE mark)	200
Exercise protocols	201
▶ Protocols for cycloergometers	201
Sub-maximal protocol (auto)	201
Bike-Ramp 10W/min (patients, limited exercise tolerance)	202
Bike-Ramp 15W/min (elderly people/deconditioned)	202
Bike-Ramp 20W/min (sedentary)	202
Bike-Ramp 25W/min (men average condition, women fit)	202
Bike-Ramp 30W/min (men fit, women athlete)	202
Bike-Ramp 40W/min (men athlete)	202
▶ Protocols for treadmills	203
Bruce	203
Modified Bruce	204
Balke	205
Modified Balke	206
Run 10 Km/h/6.2 mph	207
Run 12 Km/h/7.5 mph	208
Run 14 Km/h/8.7 mph	209
Run 16 Km/h/10 mph	210
Run 18 Km/h/11.2 mph	211
Run 20 Km/h/12.4 mph	212
Astrand	213
List of compatible ergometers	214
Integration with GE Cardiosoft (Fitmate Pro/Med only)	215
▶ Enabling Cardiosoft for the communication with a Metabolic Cart	215
▶ Interface Cable	215
▶ Fitmate configuration	215
▶ End of the test	215

Technical specs	216
▶ Sensors	216
Oxygen	216
Flow and volume (flowmeter RMR 18 mm).....	216
Flow and volume (flowmeter VO ₂ max 28 mm)	216
Barometric pressure	216
▶ Power supply	216
Old models (till S/N XXXXXX0999)	216
New models (from S/N XXXXXX1000)	216
Battery charger	216
▶ Autonomy.....	216
Old models (till S/N XXXXXX0999)	216
New models (from S/N XXXXXX1000)	216
▶ Display.....	216
▶ Dimensions and weight	217
▶ Interface	217
▶ Canopy.....	217
Backup batteries	217
Dimensions and weight	217
Spare parts	218
▶ Consumables	218
▶ Cables	218
▶ Heart rate parts	218
▶ Calibration parts	218
▶ Flowmeters.....	218
▶ Masks	218
▶ Canopy.....	218
▶ Miscellaneous	219
References.....	220
Fitness assessment	220
Spirometry	220
Cardiopulmonary exercise testing (VO ₂ max).....	220
Indirect calorimetry	220
Sub-maximal test	220
Risk analysis	220
Canopy	220
Oximeter	221

Getting started

Important notes

► Intended use

Fitmate is an electronic device developed for performing the following test types:

	Fitmate	Fitmate PRO	Fitmate MED	Fitmate GS
Resting metabolism (with mask or canopy)	x	x	x	x
Cardiorespiratory fitness (VO ₂ max)		x	x	
Basic spirometry (FVC, SVC, MVV)			x	
Oximetry			x (option)	
Fitness assessment		x		

Fitmate allows for the automatic generation of:

- Personalized weight management programs
- Personalized exercise prescriptions according to the ACSM's (American College of Sport Medicine) latest recommendations

Fitmate may be used as a medical device. It can be used as an auxiliary instrument for diagnosis and prescription of pharmacological agents and/or rehabilitation treatments ONLY under the supervision of a licensed physician.

Fitmate Med is intended exclusively for physicians or expert staff supervised by a physician.

Caution: Federal law restricts this device to sale by or on the order of a physician.

Warning: "Personal Weight Management" and "Exercise Prescription" reports contain statements which are not intended to be used to diagnose, treat, cure or prevent any disease without being reviewed by a physician. Any weight management or fitness program must be reviewed by a physician.

Attention: Cardiopulmonary Fitness Assessment through Maximal exercise testing can be performed only in the presence of a physician. If there is no doctor present, **only** sub maximal exercise tests should be performed.

RMR tests with Canopy option can be performed only on subjects weighing 25 kgs (55 lbs) or above.

COSMED Srl is not responsible for any accident occurring from a wrongful use of this device, such as:

- use by unqualified people;
- disregarding the intended use of this device;
- disregarding the hereunder precautions and instructions.

► Warnings

The recommendations and the warnings hereinafter mentioned are in accordance with the most recent accepted international standards. Make sure that local laws do not apply further restrictions.

The device, the program, the algorithms and the presentation of measured data have been developed in accordance with the recommendations developed by internationally accredited organizations (ACSM, WHO, AHA,...). All of the relevant references can be found in the Appendix.

Read the following precautions before using the device.

1. This user manual is part of the device and should always be available for reference.
2. Safety, measurement accuracy and precision can be assured if:
 - only accessories described in this manual are used. Other accessories may cause malfunction;
 - all repairs are performed by an authorized COSMED technician;
 - the environmental conditions and the power supply must be in compliance with this manual.
 - ordinary equipment maintenance, inspection, disinfection and cleaning are performed as recommended;
3. Before powering on the system, check the power cables and plugs. If a visual inspection reveal electrical or mechanically damaged parts, they must be replaced immediately COSMED.
4. Aspiration of contaminants can be potentially life-threatening. Use disposable anti-bacterial filters or the RMR masks, or disinfect each part in contact with the patient before each test.

5. Follow all the cleaning procedures described in this manual precisely and thoroughly inspect all the components of the respiratory circuit after cleaning and before each patient test.
6. To avoid choking or strangulation, avoid entanglement of cables or cords around the user's or subject's neck.
7. Fitmate is not an AP nor an APG device (according to the EN 60 601-1 definitions) and it is therefore not suitable for use in presence of flammable anaesthetics.
8. Keep the device away from heat and flame sources, flammable or inflammable liquids or gases and potentially explosive atmospheres.
9. Fitmate is not to be handled together with other medical devices unless directed by the manufacturer
10. It is recommended to use a computer with electromagnetic compatibility CE marking and with low radiation emission displays.
11. If Fitmate is connected to a PC and used as medical device, PC and/or printer must be EN 60601-1 compliant by means of an isolation transformer.
12. Cardiopulmonary Fitness Assessment using the maximal exercise testing protocols can only be performed with a physician present. In the absence of a physician, only sub-maximal exercise protocols may be used.
13. The Fitmate needs special precautions regarding EMC. It needs to be installed and put into service according to the EMC information provided in the EMC section
14. Mobile devices, (i.e. cell phones and other RF devices) may cause interference with the Fitmate.
15. Only use the cables and accessories supplied with the Fitmate. Unauthorized accessories and cables may cause equipment malfunction.
16. Fitmate should not be used adjacent to or stacked on top of other equipment. If it is necessary to stack the Fitmate, ensure that the equipment is working properly before subject testing.
17. Disconnect the battery charger from the wall socket in order to disconnect the device from the mains.
18. Graphical symbols hereinafter used in accordance to the present specifications are described here below:



Equipment type BF (EN60601-1)



OFF



ON



Alternating current



Refer to the instructions for use

► Contraindications for Exercise testing

Absolute contraindications

- Acute MI (within 2 days)
- High-risk unstable angina
- Uncontrolled cardiac arrhythmias causing symptoms of hemodynamic compromise
- Active endocarditis
- Symptomatic severe aortic stenosis
- Decompensated symptomatic heart failure
- Acute pulmonary embolus or pulmonary infarction
- Acute noncardiac disorder that may affect exercise performance or be aggravated by exercise (eg, infection, renal failure, thyrotoxicosis)
- Acute myocarditis or pericarditis
- Physical disability that would preclude safe and adequate test performance
- Inability to obtain consent

Relative contraindications

- Left main coronary stenosis or its equivalent

- Moderate stenotic valvular heart disease
- Electrolyte abnormalities
- Tachyarrhythmias or bradyarrhythmias
- Atrial fibrillation with uncontrolled ventricular rate
- Hypertrophic cardiomyopathy
- Mental impairment leading to inability to cooperate
- High-degree AV block

Note: *Relative contraindications can be superseded if benefits outweigh risks of exercise.*

► Environmental conditions

COSMED units have been manufactured to operate in medically utilized rooms without potential explosion hazards.

The units should NOT be installed in the vicinity of x-ray equipment, motors or transformers with high power rating. This may cause interference and may falsify the test results.

Fitmate is made of highly precise electrical and mechanical components. COSMED equipment is not AP not APG devices (according to EN 60601-1): they are not suitable for use in the presence of flammable anaesthetic mixtures with air, oxygen or nitrogen protoxide.

If not otherwise stated in the accompanying documents, COSMED equipment has been manufactured for operation under normal environmental temperatures and conditions [IEC60601-1/EN60601-1].

This device must be used under the following environmental conditions:

- Temperature: 10°C (50°F) to 40°C (104°F).
- Relative humidity: 10% to 90%.
- Atmospheric Pressure: 700 to 1060 mmHg
- Do not use Fitmate in a dusty environment, near noxious fumes or heat sources.
- Do not store near heat sources.
- While performing exercise tests, ensure that there is adequate room around the subject.
- Use in a well ventilated room.

EMC

Guidance and manufacturer's declaration - electromagnetic emissions

The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. The device is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class B	
Harmonic Emission IEC 61000-3-2	Class A	
Voltage Fluctuations / Flicker Emission IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity

The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.

Immunity test	Test level IEC 60601-1	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycles 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycles 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the device requires continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Nota: U_T is the a.c. mains voltage prior to application of the test level.

Guidance and manufacturer's declaration - electromagnetic immunity

The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.

Immunity test	Test level IEC 60601-1	Compliance level	Electromagnetic environment – guidance
Conducted RF IEC 61000-4-6	3 V _{eff} 150 kHz to 80 MHz	3 V	Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter Recommended separation distance $d = 1.17 \sqrt{P}$ $d = 1.17 \sqrt{P} \quad 80 \text{ MHz to } 800 \text{ MHz}$ $d = 2.33 \sqrt{P} \quad 800 \text{ MHz to } 2.5 \text{ GHz}$ where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey^a, should be less than the compliance level in each frequency range^b. Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	

Notes:

(1) At 80 MHz, the higher frequency range applies.

(2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the device is used exceeds the applicable RF compliance level above, the device should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the device.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m

Recommended separation distances between portable and mobile RF communications equipment and the device

The device is intended for use in an environment in which radiated RF disturbances are controlled. The customer or the user of the device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the device as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d=1.17 \sqrt{P}$	80 MHz to 800 MHz $d=1.17 \sqrt{P}$	800 MHz to 2.5 GHz $d=2.33 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.70	3.70	7.38
100	11.70	11.70	23.33

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Notes:

- (1) At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
- (2) These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

How to use this manual

This manual is structured in the following 10 chapters:

1. *Getting started*: briefly describes the Fitmate, illustrates its intended use and warnings.
2. *How to read the results*: illustrates how tests and test results are presented to the user.
3. *Installation*: guides the end user through the entire installation process.
4. *Fitmate Operation*: illustrates the functions of the device including managing data and test performance.
5. *Maintenance*: describes maintenance procedures.
6. *Installation and activation of software*: installation and activation of software.
7. *User interface and settings*: describes the user interface and the initial equipment configuration (language, settings, report heading, parameters,...).
8. *Software features*: the features of the software on the Fitmate.
9. *Performing tests using the PC Software*: performing a test.
10. *Appendix*: includes information about warranty, COSMED legal obligations for the personal data management and information about integrated exercise protocols, normal values and the reference bibliography.

We recommend that all users read the first three (1-3) chapters carefully before using Fitmate.

If the Fitmate is intended to be used as a stand-alone device (without a PC connection), then it is recommended that chapters 1-5 be read.

If using the Fitmate connected to a PC, read chapters 1-9. This will cover all operating modes of the device.

► Conventions

Hereunder reported are all the graphical and typographical conventions used in this manual.

Typographical conventions

Style	
Bold	Represents a command or a button to press
<i>Italic</i>	software message

Graphical conventions

Illustration	represents
	Icon referred to a specific function of Fitmate

Introducing Fitmate

Fitmate is available in the basic, Pro, Med and GS configurations. Check in the table below for comparison of the three configurations.

Test	Fitmate	Fitmate Pro	Fitmate Med	Fitmate GS
Pre-test screening*	✓	✓	✓	✓
Resting Metabolic Rate - RMR (with mask or canopy)	✓	✓	✓	✓
Body composition	✓	✓	✓	✓
Personalized weight management program	✓	✓	✓	✓
Daily nutritional needs*	✓	✓	✓	✓
Cardio Respiratory Fitness (VO ₂ max)		✓	✓	
Muscular Fitness		✓		
Flexibility Assessment		✓		
Fitness goals definition*		✓	✓	
Energy Expenditure during exercise		✓		
Exercise Prescription*		✓	✓	
Basic spirometry			✓	
Oximetry (option)			✓	
Risk analysis			✓	
* test performed through PC only				

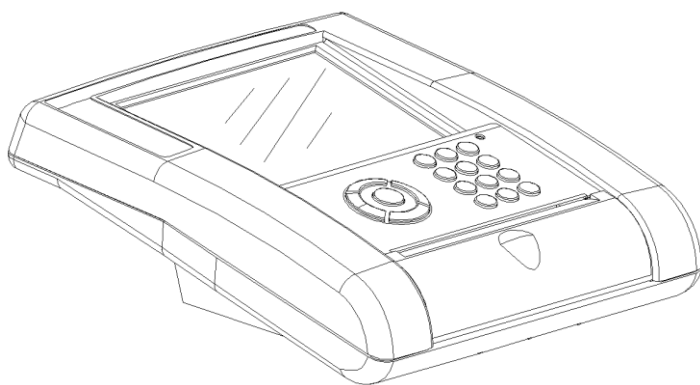
► Description of Fitmate

Fitmate consists of the following parts:

- Fitmate unit
- Battery Charger
- Optoelectronic reader, mask and other accessories

Below is a brief description of each part and how to connect them to the Fitmate unit.

► Fitmate Unit



The Fitmate unit is composed by:

- Colour display
- Keyboard
- Built-in printer
- Connectors on the rear panel.

The display

The color display allows the user access to all the functions, to visualize the tests performed and to navigate through the subject database.

The Keyboard

Fitmate has a built-in numeric keyboard (see below):



The arrow keys to the left on the keyboard act as the navigator tool. This allows the user to scroll through the windows and confirm their selections.

The 10 alphanumeric numbers to the right on the keyboard allow for input as well as powering the Fitmate.

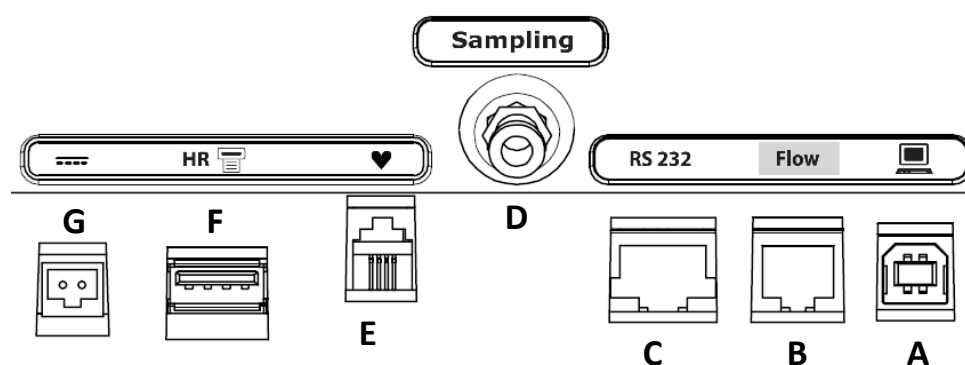
For a better understanding of each single button functionality please refer to the Chapter *Fitmate Operation*.

The printer

The built-in thermal printer allows the user to print tests performed. For more information please refer to the Chapter *Fitmate Operation*.

The rear panel

There are 7 connectors located in the rear panel as illustrated below:



Above each connector, labels specify the type of connector. From right to left they are respectively:

- A USB port for PC connection.
- B Optoelectric reader connector.
- C RS232 serial port for PC connection (if PC does not have a USB port) or for controlling an ergometer.
- D Gas sampling line connection.
- E Heart rate probe (Polar) connector.
- F USB port for an external printer (optional) or heart rate probe (ANT) connector.
- G External power connector.

► Battery Charger

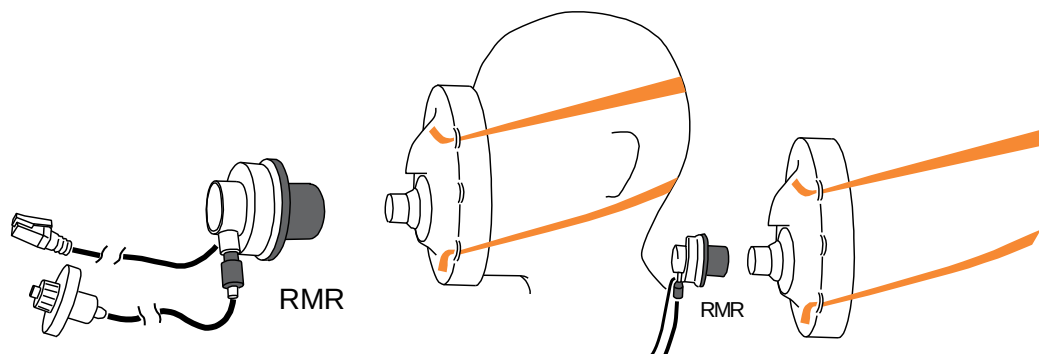
Fitmate is powered by rechargeable batteries.

For information on connecting the battery charger and other information related to charging the internal batteries, please refer to the *Installation* chapter.

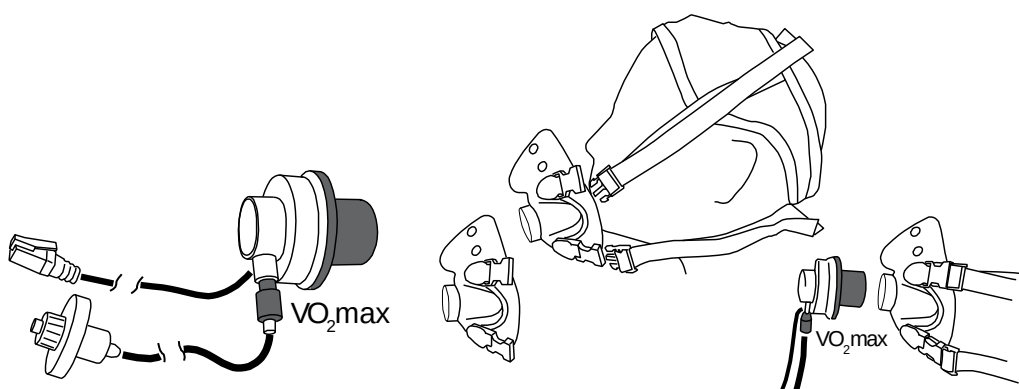
► Reader and Mask

Fitmate is supplied with an optoelectronic reader which allows the measurement of the inspired and expired flows and volumes and a disposable subject mask.

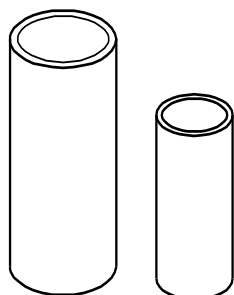
The reader, *RMR reader*, and the mask, *RMR mask*, are used when performing RMR tests. For more information on this subject please refer to the chapter *Fitmate Operation*.



Fitmate Pro and Fitmate Med have an additional optoelectronic reader (VO₂max reader, which has a larger diameter) as well as a reusable mask (VO₂ mask) specifically used for cardio-respiratory fitness assessment testing. For information on cleaning the VO₂ mask, please refer to the Maintenance chapter.

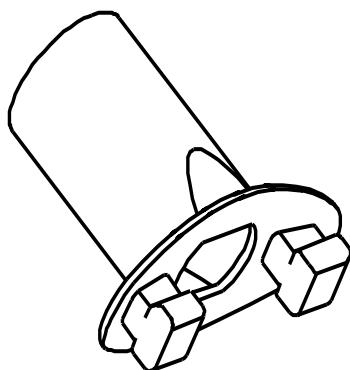


► Paper mouthpieces



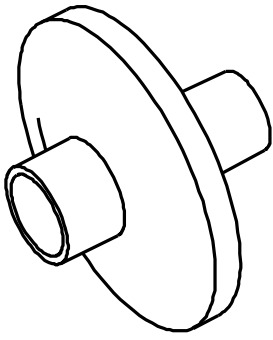
Fitmate Med also includes disposable paper mouthpieces for basic spirometry (FVC, VC, and MVV).

► Soft mouthpieces



The PTE soft mouthpieces can be used during cardio-respiratory fitness assessment in subjects whose ventilation is less than 100 l/min. It should be used in conjunction with an antibacterial filter and nose clip in place of the VO₂ Mask.

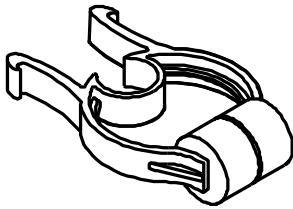
► Antibacterial filters



Antibacterial filters are recommended for infection control. Regular cleaning and decontamination of equipment should always be performed.

Note: The use of antibacterial filters is recommended even when using disposable mouthpieces to prevent cross-contamination.

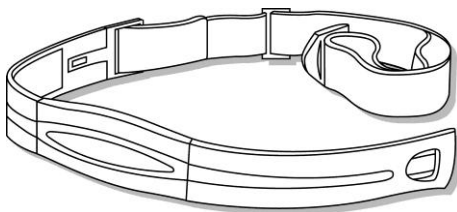
► Nose clips



Nose clips should be used while performing spirometry tests in order to prevent respiration through the nasal passage during each manoeuvre.

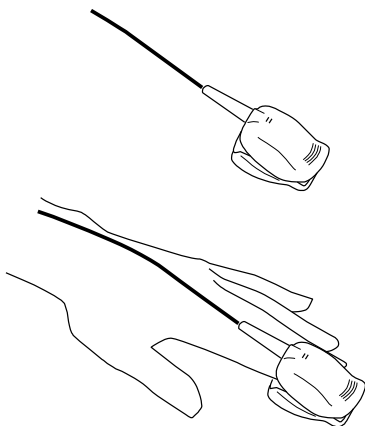
► The HR probe

The HR probe consists of three parts: the elastic belt containing the transmitter and the USB receiver. The parts should be assembled as close as possible to one another to acquire the most effective communication signal.



Note: Firmware versions up to 2.1 are compatible only with USB1 probes, firmware version starting from 2.2 are compatible also with USB2 probes.

► The oximeter



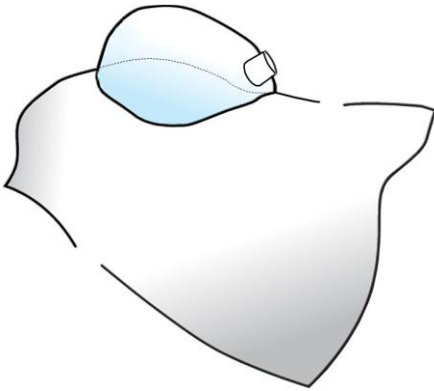
The oximeter probe should be placed on the patient's finger when measuring oxygen saturation at rest or during exercise (only during SpO₂ tests).

► The canopy

The canopy module can be used only on device with S/N above XXXXXX1000.

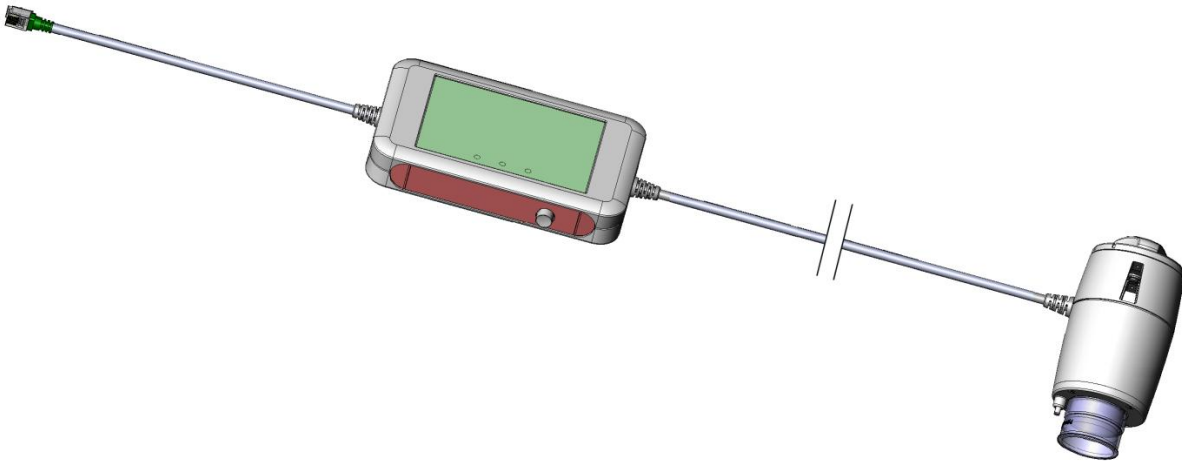
It is made of different items:

The canopy hood with vail



The canopy hood allows the patient's exhaled air to blend with ambient air. This mixture is then inspired by a pump with a known flow and the patient's Oxygen Consumption and Energy Expenditure can be calculated.

Canopy blower and unit



The canopy blower and the Canopy unit generate the known flow for performing the Canopy test and perform the safety checks.

Reading the results

Data presentation and values

Below are the guidelines which were used in determining the format of the data and the predicted values:

ACSM's Guidelines for Exercise Testing and Prescription-Sixth edition (1994)

Frankenfield DC, et al. The Harris-Benedict studies of human basal metabolism: history and limitations. J Am Diet Assoc. 1998;98:439-445

Sixth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure, NIH publication, 1997

Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: National Institute of health. National Heart, Lung, and Blood Institute

European Guidelines on CVD Prevention: Third Joint European Societies' Task Force on Cardiovascular Disease Prevention in Clinical Practice. De Becker G., Ambrosini E., Barch-Johnsen K., et al. Eur. J. Cardiovasc. Prev. Rehabil. 2003, 10 (Suppl 1): S1-S78.

AHA/ACC Scientific Statement: Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations : A Statement for Healthcare Professionals From the American Heart Association and the American College of Cardiology. Scott M. Grundy, Richard Pasternak, Philip Greenland, Sidney Smith, Jr, and Valentin Fuster Circulation 1999 100: 1481 – 1492.

Frammingham Study: Wilson PW, D'Agostino RB, Levy D, Belanger AM, Silbershatz H, Kannel WB. Prediction of coronary heart disease using risk factor categories. Circulation. 1998;97:1837–1847.

DeLong, Frank E. Harrell, Jr, Lawrence H. Muhlbaier and Daniel B. Mark Leslee J. Shaw, Eric D. Peterson, Linda K. Shaw, Karen L. Kesler, Elizabeth R. Use of a Prognostic Treadmill Score in Identifying Diagnostic Coronary Disease. 1998;98;1622-1630 Circulation

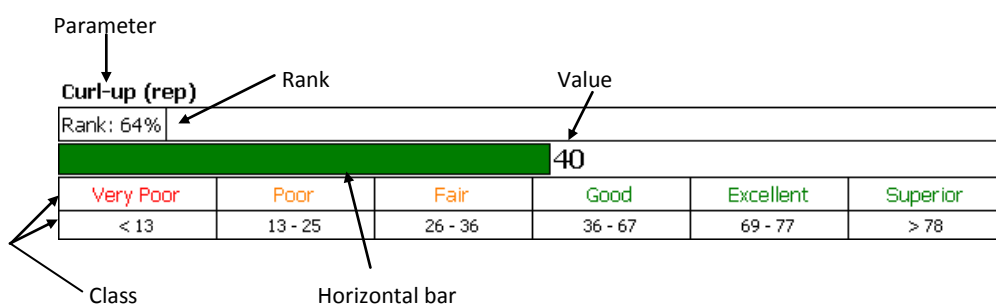
Celli BR, Cote CG, et al. The Body-Mass Index, Airflow Obstruction, Dyspnoea, and Exercise Capacity Index in Chronic Obstructive Pulmonary Disease. N Engl J Med. 2004; 350: 1005-1012.

► Data presentation

The values measured and/or entered are presented in the 4 following modes:

- Value
- Rank
- Horizontal bar
- Class

Some tests have different data presentation



Values

Each value refers to a single parameter (e.g., Flexibility, Blood pressure, Percentage of body fat, etc.) and may be measured directly by the equipment or entered by the user.

Rank

Rank is a numerical index (between 0 and 100) that quantifies the status of a specific physiologic parameter. The higher is the rank the better is the health status as referred to that specific parameter.

In parameters which a higher number is more desirable, the Rank refers to the percentage of population which is under the measured value.

In parameters which a lower number is more desirable, the Rank refers to the percentage of population which is above the measured value. RMR, BMI, WHR and risk factors are not ranked.

Horizontal bar

The horizontal bar graphically represents the measurement performed.

In the PC software, the horizontal bar may have 3 colors:

- Green indicates a positive response
- Orange indicates an ordinary or poor response
- Red indicates a very negative response

Classes

Each single parameter measured is graded on a scale which, for most parameters, has six steps or classes:

Rank	Class
0-20	<i>very poor</i>
20-40	<i>poor</i>
40-60	<i>fair</i>
60-80	<i>good</i>
80-95	<i>excellent</i>
95-100	<i>superior</i>

The values for RMR are compared to the predicted ones, calculated with the Harris-Benedict equation, and classified according to the following scale:

RMR	Criteria
Low	If the measured value is $\geq 14\%$ lower than the predicted value
Normal	If the measured value is between 86% and 114% of the predicted value
Fast	If the measured value is $\geq 14\%$ higher than the predicted value

For the evaluation of Blood pressure, BMI, WHR and risk factors, other norms and different scales are used.

Additional statements

Some parameters (e. g. Percentage of body fat and Blood pressure) have additional statements associated with them to help better describe their status. Examples of statements are: *Unhealthy range (too low)*, *Acceptable range (lower end)*, *Acceptable range (higher end)*, *Unhealthy range (too high)* etc.

Installation

Before starting

Before operating Fitmate it is highly recommended you to inspect the equipment and register your equipment with COSMED.

► Checking the contents of the package

Make sure that the package contains all the items listed below. If there are missing or damaged parts, contact your local COSMED distributor.

Fitmate standard packaging

Code	Quantity	Description
C00966-01-04	1	Fitmate unit
C02580-01-05	10	RMR mask
C02500-01-04	1	RMR reader
A-362-315-001	1	USB cable
A-196-056-001	1	Printer paper roll
C02383-01-05	1	Battery charger / power supply
A-662-150-002	1	Extensible meter
A-201-500-027	1	Suit case
C02522-01-20	1	O ₂ sensor extracting tool
A-558-250-005	1	O ₂ sensor
C03494-00-11	1	PC software

Fitmate Pro standard packaging

Code	Quantity	Description
C00966-02-04	1	Fitmate Pro unit
C02580-01-05	10	RMR mask
C02500-01-04	1	RMR reader
A-362-315-001	1	USB cable
A-196-056-001	1	Printer paper roll
C02383-01-05	1	Battery charger / power supply
A-662-150-002	1	Extensible meter
A-201-500-027	1	Suit case
C02522-01-20	1	O ₂ sensor extracting tool
A-558-250-005	1	O ₂ sensor
C02560-01-04	1	VO ₂ max reader
C03612-01-10	1	Reusable mask for VO ₂ max (Medium)
A-661-200-040	1	HR monitor
A-661-200-039	1	HR probe
A-800-900-023	1	Head cap (Small, medium)
A-182-300-004	5	Antibacterial filter
C00269-01-20	5	Soft mouthpiece (PTE ID25mm)
A-662-100-001	2	Nose clip
A-362-300-006	1	Ergometer cable
C03494-00-11	1	PC software

Fitmate Med standard packaging

Code	Quantity	Description
C00966-03-04	1	Fitmate Med unit
C02580-01-05	10	RMR mask
C02500-01-04	1	RMR reader
A-362-315-001	1	USB cable
A-196-056-001	1	Printer paper roll
C02383-01-05	1	Battery charger / power supply
A-662-150-002	1	Extensible meter
A-201-500-027	1	Suit case
C02522-01-20	1	O ₂ sensor extracting tool
A-558-250-005	1	O ₂ sensor
C02560-01-04	1	VO ₂ max reader
C03612-01-10	1	Reusable mask for VO ₂ max (Medium)
A-661-200-040	1	HR monitor
A-661-200-039	1	HR probe
A-800-900-023	1	Head cap (Small, medium)
A-182-300-004	5	Antibacterial filter
C00269-01-20	5	Mouthpiece PTE ID25mm
A-662-100-001	2	Nose clip
C03095-01-08	1	Handle for reader
C00136-01-20	20	Adult paper mouthpiece
C00137-01-20	10	Paediatric paper mouthpiece
C00214-01-20	1	Paediatric mouthpiece adapter
A-362-300-006	1	Ergometer cable
C03494-00-11	1	PC software

Fitmate GS standard packaging

Code	Quantity	Description
C00966-04-04	1	Fitmate GS unit
A-362-315-001	1	USB cable
A-196-056-001	1	Printer paper roll
C02383-01-05	1	Battery charger / power supply
A-662-150-002	1	Extensible meter
A-201-500-027	1	Suit case
C02522-01-20	1	O ₂ sensor extracting tool
A-558-250-005	1	O ₂ sensor
C03784-01-04	1	Canopy Fitmate Unit
C03886-01-10	1	Canopy veil
C03880-02-10	1	Canopy hood
C02235-01-05	1	Turbine T2
C03494-00-11	1	PC software

Canopy module (option for Fitmate, Fitmate PRO, Fitmate MED)

Code	Quantity	Description
C03784-01-04	1	Canopy Fitmate Unit
C03886-01-10	1	Canopy veil

C03880-02-10	1	Canopy hood
C02235-01-05	1	Turbine T2
C03494-00-11	1	PC software

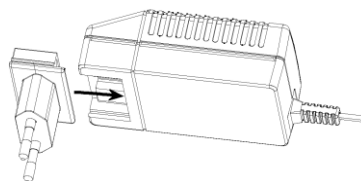
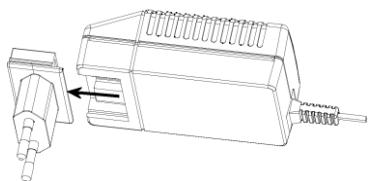
► Minimum PC configuration

- Pentium II 350 MHz
- Windows XP, Windows Vista, Windows 7.
- 256 Mb RAM
- CD-ROM drive
- VGA or SVGA monitor
- Available USB or Serial (RS232) port
- MS Windows™ compatible mouse and printer.
- PC must be compliant with the European directive 89/336 EMC

► Power plug replacement

If the plug on the power supply is not for your country, replace with the proper one from the Fitmate packaging.

1. Extract the plug from the battery charger
2. Insert the proper plug in the battery charger.



► O₂ sensor installation

The Fitmate unit is supplied without an installed O₂ sensor. Before using the device, install the O₂ sensor according to the instructions in the *Maintenance* chapter.

► Product registration

Before powering on the Fitmate it is required to:

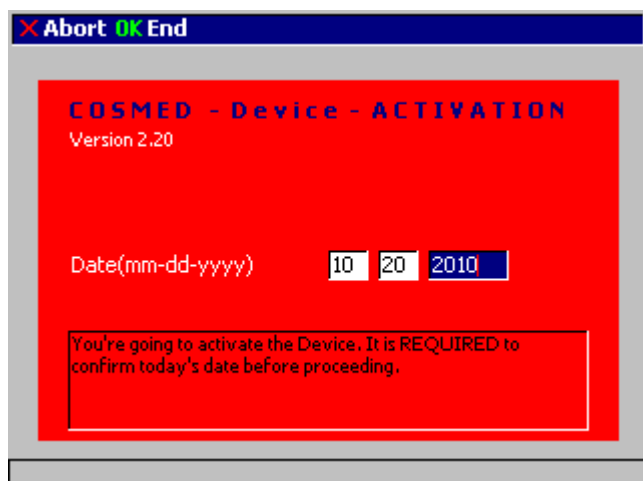
1. Activate the Fitmate Unit (within 30 days since first use)
2. Activate the PC SW (before starting using it)

A Fitmate works without activation for 30 days after the first use. Once this period has expired, it is impossible to operate the Fitmate until the unit is properly activated.

Activating the Fitmate Unit

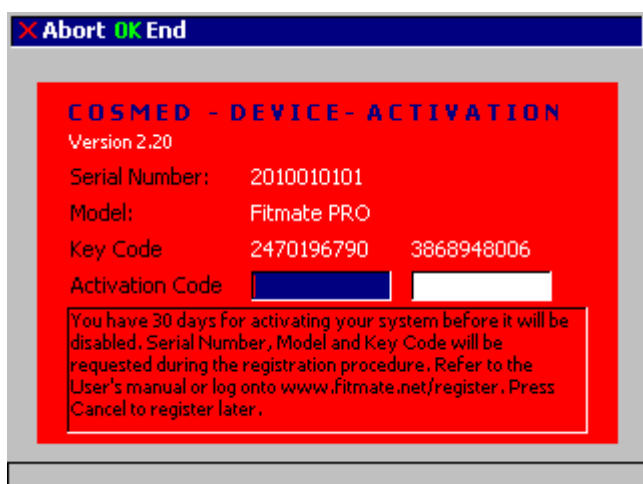
To activate the unit:

1. Set the date as soon as the Fitmate is turned-on the very first time.



2. Read the on screen prompts and accurately verify the following data:

- **Serial Number:** This is the serial number found on the back of the Fitmate.
- **Model:** Fitmate, Fitmate Pro, Fitmate Med or Fitmate GS.
- **Key Code:** This is a security number generated by the instrument and is necessary for the correct activation of the unit



3. If you would like to skip the registration process, press the  key and keep working with the unit.
 4. To obtain the activation code, you will need to send a Fax to COSMED (+39-069314580) or e-mail register@fitmate.net including all the information in the *Registration Form* which can be found in the *Appendix*.
 5. COSMED will then send the activation codes which include the information referred to the enabled Software version.
 6. You will enter the activation code in the appropriate fields when turning on the Fitmate.
- The activation code may also be entered by selecting **3.Options/6.Activate FITMATE** from the main menu.

PC Software Registration

The Fitmate PC Software is automatically activated when connecting a **previously activated** Fitmate. This activation expires after 30 days without Fitmate being connected. To renew the registration, just connect a Fitmate. For further details, see the *Software Installation and activation* chapter.

For more information contact

COSMED S.r.l.

Via dei Piani di Monte Savello, 37

PO Box 3

00041 - Pavona di Albano (Rome) Italy

Ph: +39.06.93.15.492

Fax: +39.06.93.14.580

email: customersupport@cosmed.it

Internet <http://www.cosmed.it>

<http://www.fitmate.net>

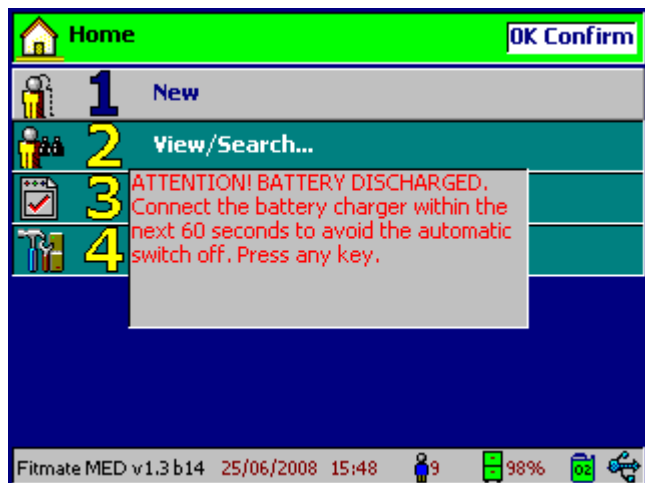
Claims and suggestions

Please send an email to complain@cosmed.it if you should have claims and/or suggestions

► Charging the batteries

Note: The first time you use the device, charge the battery for at least 3 hours.

When the batteries are low, a message asks the user to connect the battery charger within the next 60 seconds to avoid the automatic switch off. Press any key to cancel the warning.



Connect the battery charger to the Fitmate unit through in the socket marked by the symbol .

Note: Fitmate is always powered through the batteries, even if it is connected to the mains. If you have fully discharged batteries, please charge them for at least 1 hour before operating with the Fitmate.

A led indicates the battery status:

Green led Charging

Orange led Fully charged

Red led Error (only old models, until S/N XXXXXX0999)

The red led can be due to:

- The battery is too cold (<5°C). The red led should switch off when the battery warms up (5-45°C).
- The battery is too warm (>45°C). The red led should switch off when the battery cools down 5-45°C.
- Very low battery. It occurs when the unit is left unused for long period of time. The battery has almost completely discharged.. The led will switch to green after charging for a while Do not disconnect the Fitmate from the battery charger until the unit has been fully charged.
- Battery failure. Please contact technical support

Note: Fitmate can be used without being plugged into the wall. If the batteries are completely charged, disconnect the battery charger and operate as normal.

Note: The batteries must be replaced when they do not maintain their charge for enough time. Please contact the technical support.

Note: Attention! If the battery is very very low (for example, if the unit has been not used for a long time), let the unit charge for some minutes without turning on it. Otherwise, acoustic signals and display flashes can occur. To stop this sequence, press the key 3 and wait some minutes before turning on the unit again.

Connecting the Fitmate to a PC

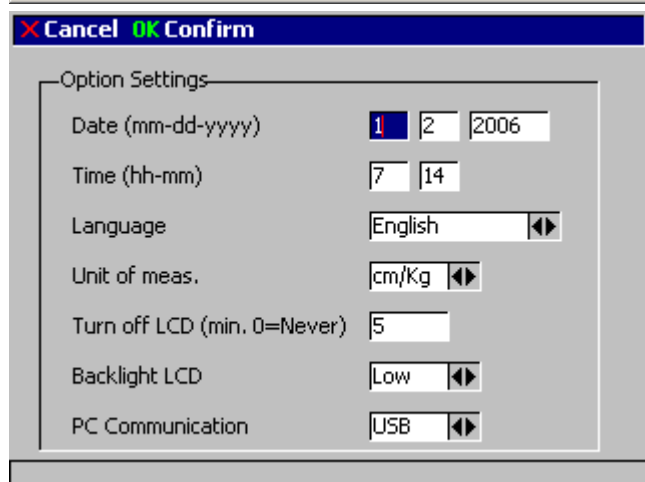
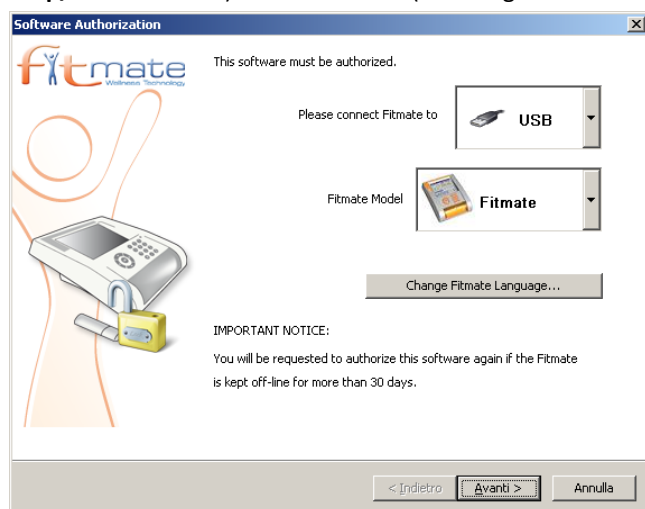
The Fitmate can be directly connected to a PC for data transfer, data storage and analysis. The PC also allows for data back-up to a variety of storage devices (HDD, floppy, CD ROM). The test data can be exported in several formats.

If Fitmate is connected to a PC and used as medical device, PC and/or printer must be EN 60601-1 compliant by means of an isolation transformer

Fitmate can be connected to PC through the USB port located in the rear panel and marked by the symbol .

If no USB ports are available on the PC, the Fitmate can be connected through the RS232 serial connection (cable not included).

Select the communication port both on the PC (when authorising the software, or selecting the menu item **Help/Reauthorize...**) and on the unit (selecting the menu item **3.Options/1.Settings**).

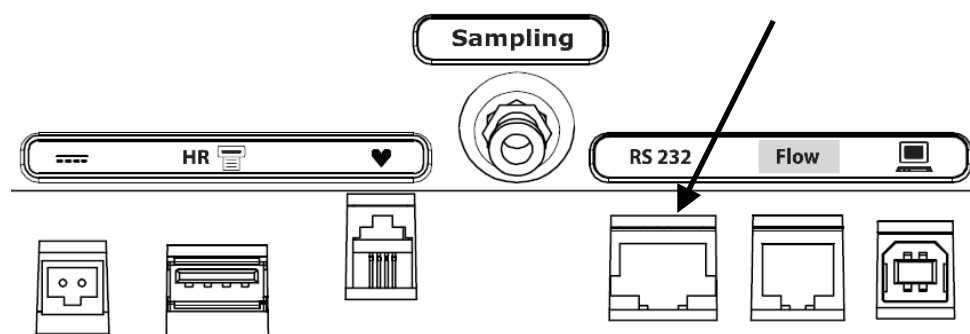


The first time the Fitmate and PC are connected via USB, you will be required to install the USB drivers from the included CD. For more information, see the *Installation and activation of Software* chapter.

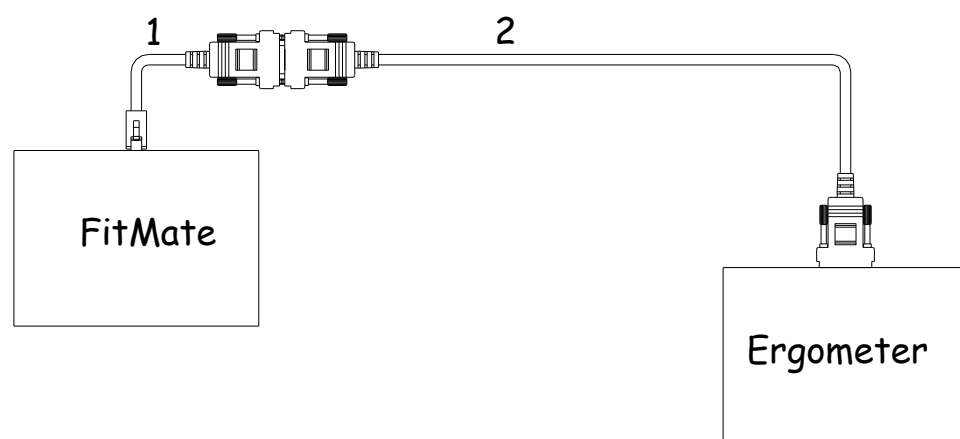
When the Fitmate and PC are connected and the Fitmate is being used as a medical device (as fixed by the EN 60601-1-1), then all of the equipment must be compliant with EN 60601-1 by means of an isolation transformer.

Connecting the Fitmate to an ergometer

Fitmate communicates and controls a variety of ergometers through the RS232 port on the rear panel of the unit.



In order to connect the Fitmate to an ergometer, it is required to use two cables: the Fitmate ergometer cable (A-362-300-006, in the Fitmate standard packaging) and the RS232 cable for the specific ergometer. See the diagram below for interfacing the Fitmate with an ergometer.



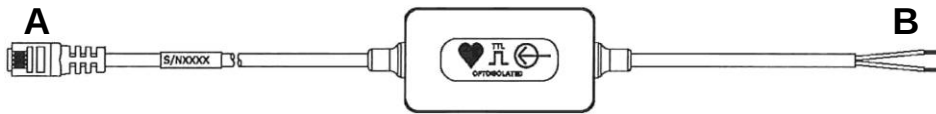
1. Fitmate ergometer cable (A-362-300-006)
2. RS232 cable of the ergometer

Note: Each ergometer model has a proprietary RS232 cable. Only use the proper cable.

Interface Fitmate Med with an external ecg

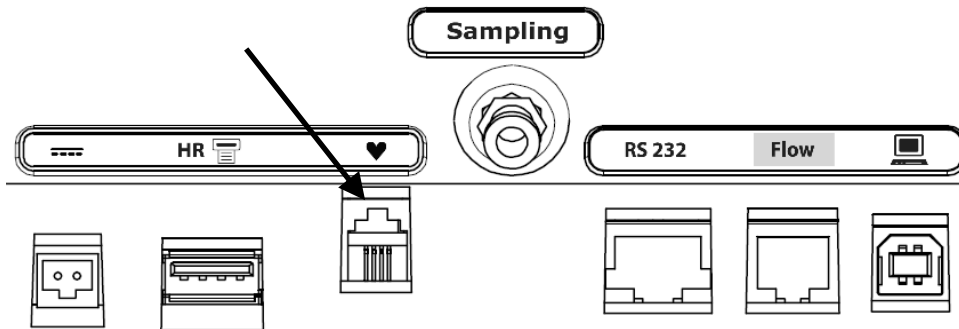
Fitmate Med can be interfaced with an external ecg with TTL output in order to receive the heart rate signal directly from the ecg.

To connect the Fitmate with the external ecg, use the opto-insulated ecg-Fitmate cable (code A-661-200-045).



The B side must be properly faced with the proper connector (the black line is the reference, the white one is the signal). Please refer to the ecg instructions for the signals on the lines and the required connector.

The A side must be connected to the port on the rear panel of the unit shown in the following picture.



Fitmate Operation

User interface

The keypad and arrow keys control all the functions of the Fitmate.



► Powering the unit on/off

To turn the Fitmate on/off, press the on/off button  for up to 4 seconds.

To save energy Fitmate will automatically:

- Dim the display when not in use. This time interval can be adjusted (see the Options section of this manual). To reactivate the display press any button.
- Power down the unit after 5 minutes of idle time. To turn the unit back on, hold the on/off button for up to 4 seconds.

Note: If the unit automatically powers down, all unsaved data or incomplete test data will be lost.

Note: Attention! If the battery is very very low (for example, if the unit has been not used for a long time), let the unit charge for some minutes without turning on it. Otherwise, acoustic signals and display flashes can occur. To stop this sequence, press the key 3 and wait some minutes before turning on the unit again.

If the available memory is less than 20%, a warning message recommend to download tests on PC before going on.

1. Download tests on PC according to the instruction reported in the chapter Software features.
2. Erase the memory, according to the instruction reported in the following of this chapter (Erase memory).

► Menus

The menus are displayed on the screen or as the header (top of the screen).

How to enter the menus

There are two ways to access the menus:

- Press the number on the keyboard which corresponds to the menu that you would like to enter.
- Use the arrow keys to navigate to the menu. Press OK to enter a menu when the menu you want is highlighted.

These methods are interchangeable.

► Keyboard

Hereunder is a brief description of the functionality of each single button of the keyboard.

Button	Description
	Turn on/off button
	Navigator tool: to scroll up a menu and/or get back to the previous field when entering data
	Navigator tool: to scroll down a menu and/or pass to the next field when entering data

	Navigator tool: to move right through the menu. To space right when entering data and/or to select an entry in case of multi options fields
	Navigator tool: to move left through the menu. To cancel the last digit when entering the data and/or to select an entry in case of multi options fields
	To enter the number 1 or one of the symbols . , ; : # @ - = ! ? \$ & / ()
	To enter the number 2 or the letters A B C
	To enter the number 3 or the letters D E F
	To enter the number 4 or the letters G H I
	To enter the number 5 or the letters J K L
	To enter the number 6 or the letters M N O
	To enter the number 7 or the letters P Q R S
	To enter the number 8 or the letters T U V
	To enter the number 9 or the letters W X Y Z
	To enter the number 0
	Cancel
	To confirm the selected entry

Functioning principles of the keyboard

Hereunder are the rules that regulate the data entry:

- If pressing repeatedly the same button, a sequence of letters, figures and symbols will display in the screen. The sequence will stop if leaving the button for more than one second or if pressing a different button. The valid digit will be the last of the sequence and the cursor will right shift of one digit.

Small letters are put after the sequence of capital letters and before the number (for example, the  key has, in order, the characters A B C a b c 2).

e. g. To enter "Ba4" it will be necessary to press the following buttons:

  <pause>          

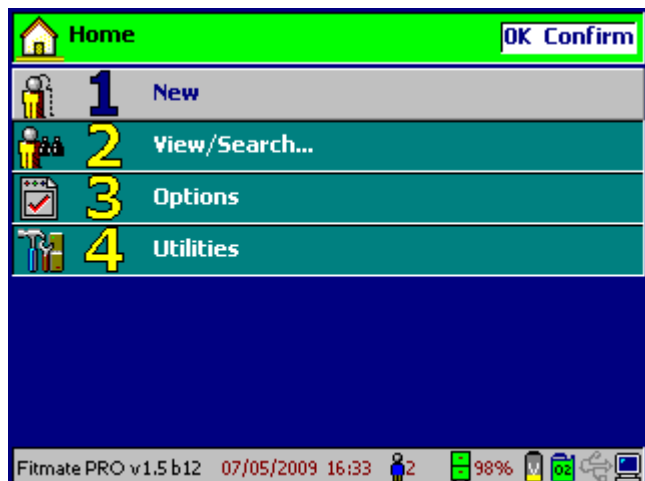
The order of the sequence of each single button is always letters and figures (figure and symbols for the button).

- Pressing the *Left* key one or more times, the cursor will move to left deleting one or more digits.
For the fields that must be mandatory filled in, the left key allows to scroll the entry options from the list.
- Pressing the *Right* key one or more times, the cursor will move to right adding blank spaces.
For the fields that must be mandatory filled in, the right key allows to scroll the entry options from the list.

► Acoustic signals

An acoustic alarm indicates an event: once you hear this, check the display for warning messages.

The main menu and the toolbar

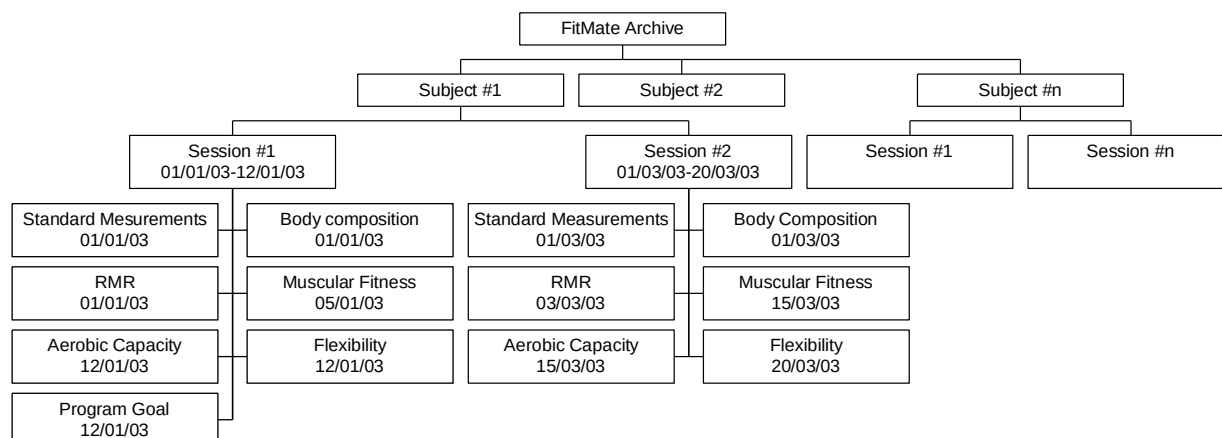


As soon as the Fitmate is turned on, the main menu appears on the display. Select the desired item to access to the Fitmate's functions.

The toolbar (in the lower part of the screen) shows the following information:

- The Fitmate model (in the above example: Fitmate PRO)
- The firmware version (in the above example: 1.5 b12)
- The current date and time (in the above example: 07/05/2009, 16:33)
- The number of patients in archive (in the above example: )
- The state of the internal memory (% of memory free)
- This icon can be in the following states:
 -  More than 50% of free space
 -  Between 20% and 50% of free space
 -  Less than 20% of free space
- The battery state
- This icon can be in the following states:
 -  Battery full
 -  Battery half
 -  Battery low
 -  Battery empty
- The O₂ sensor state
- This icon can be in the following states:
 -  Sensor is optimal
 -  Sensor is poor. Please plan for sensor replacement.
 -  Sensor exhaust. Please replace sensor
 -  There was a problem during sensor calibration. Do not perform tests.
- If USB connection to an external device (printer or ANT probe) is active
This icon is gray  if the connection is not active, otherwise it is coloured 
- If the PC connection is active
This icon is grey  if the connection is not active, otherwise it is coloured 

Archive management



The diagram above describes the layout of the Fitmate's archive.

This archive contains numerous records, one for each session for every subject which has been entered and saved.

It is possible to have multiple testing sessions for a single subject.

Every session may contain a single test or multiple tests and questionnaires, all of which are not necessarily performed on the same day. A test session cannot contain two tests of the same kind: repeating a test will end a session (no other tests can be performed) and automatically start a new session. A closed session does not have to contain all types of tests.

A warning message will prompt the user if the user attempts to perform a test which has already been performed in the current open session. A new testing session will open up if the user presses **OK**, the operation will be aborted if any other button is pressed.

► Entering a new subject

To enter a new subject select **1.New** and fill in the blank fields. Refer to the "Guide lines" for more details on the information requested.

Press **OK** to confirm or **X** to abort.

X Abort OK End

ID: 0001

Last Name: BOND

First Name: James

Test conducted by: Lana Wood

Birth(dd-mm-yyyy): 27/12/1962 Gender: M

Height (m-cm): 1/95 Weight (Kg): 95.0

► View/Search for a subject in the archive

To search for a subject who is already in the archive, select **2.View/Search...** and move through the list of subjects using the navigator tool until you find the appropriate subject.

Subject data and test sessions are respectively displayed on the bottom and on the right-hand side of the screen.

Males are marked by the symbol . Females are marked by the symbol .

X Exit OK Select > Sessions < Subjects 0 Erase	
Bond James	12/22/2005 (9)
Mr. Q	12/23/2005 (1)
Wood Lana	
ID 0001 Gender Male Date (mm-dd-yyyy) 04/04/2005 Birth(mm-dd-yyyy) 12/27/1962 Personal Trainer Lana Wood	

Press **OK** to confirm and enter the *Test* menu, press  to exit.

▶ Deleting a subject from the archive

By pressing the **0** key, the selected subject will be deleted from the archive.

X Exit OK Select > Sessions < Subjects 0 Erase	
Bond James	12/22/2005 (9)
Mr. Q	12/23/2005 (1)
Wood Lana	
ID 0001 Gender Date (mm-dd-yyyy) Birth(mm-dd-yyyy) Personal Trainer Lana Wood	

Erase subject?
 1 Confirm X Ignore

Press  to confirm, or  to cancel.

Note: Deleting a subject will not free space in the Fitmate memory.

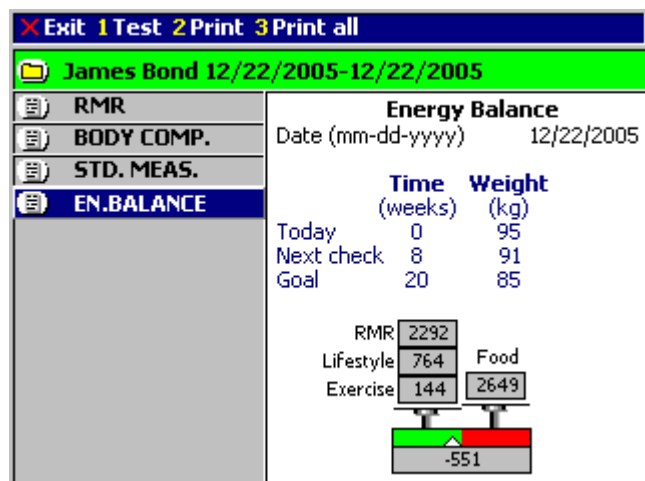
▶ Displaying a test in the archive

Once a client is selected, use the navigator tool to move through the list of available test sessions. The open sessions are marked with , the closed sessions closed are marked with .

To select the desired session and press **OK** to confirm or  to exit.

X Exit OK Select > Sessions < Subjects 0 Erase	
Bond James	 12/22/2005 (9)
Mr. Q	 12/23/2005 (1)
Wood Lana	
ID 0001 Gender Male Date (mm-dd-yyyy) 04/04/2005 Birth(mm-dd-yyyy) 12/27/1962 Personal Trainer Lana Wood	

A new window which is divided in half, will appear. The list of the executed tests will be displayed on the left as shown above. Scroll through the tests using the navigator tool. Test information is displayed on the right as shown in the figure below.



► Data editing

Note: It is not possible to modify or delete data in the memory of the Fitmate once the data is stored. The only way to clear out the memory of the Fitmate is to delete the archive (for more information, see the Utility chapter).

If you would like to delete or modify a subject's data, it is necessary to download the test and/or archive to a PC and proceed using the included Fitmate Software (see the Software features chapter).

► Entering the test menu

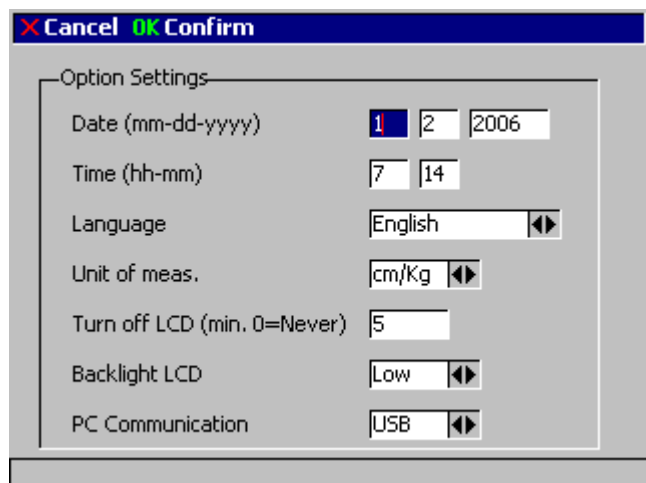
The Fitmate will automatically display the Test Menu after a new subject is entered or one is selected from the list.

To enter the Test Menu from the screen displaying the tests performed in a session, press **1.Test**.

Options

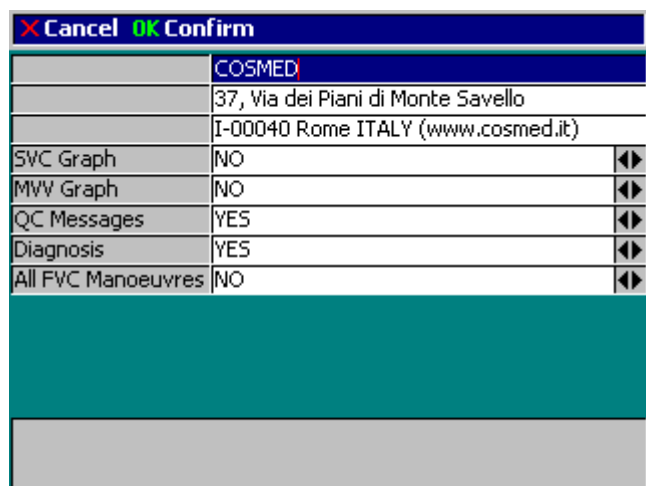
Fitmate can be customized by pressing **3.Options**.

► Settings



Select this entry to set up date, time, language, units of measurement, display automatic shutdown, backlight and PC serial port communication.

► Printout settings



Select this entry to set up the printout header.

The following options (for the spirometry printout) are available only for Fitmate Med:

- SVC Graph: shows the slow vital capacity graph
- MVV Graph: shows the maximum voluntary ventilation graph
- QC Messages: shows the quality control messages for the selected test
- Diagnosis: shows the automatic interpretation of the results
- All FVC Manoeuvres: prints all the FVC manoeuvres performed during the session.

► RMR

✕ Cancel OK Confirm	
Initial discarded interval (m")	5
Averaged interval (m")	10
End test auto print	YES
Print RMR Diagram	NO
Start/End auto detection	NO
Test Mode	Mask

Select this entry to set up the RMR related options:

- The initial time interval to discard before the data acquisition
- The averaged time interval for the RMR test
- If the automatic print at the end of the test is enabled/disabled
- If the print of the RMR graph is enabled/disabled
- If the automatic detection of the start/end of the test is enabled/disabled
- If RMR tests are performed with mask or canopy

► Advanced

This dialog is different, depending on the device (Fitmate, Fitmate Pro, Fitmate Med or Fitmate GS)

✕ Cancel OK Confirm	
Temperature(°C)	25
Temp. Flowm.(°C)	34
RMR, Resp. Quotient x100	85
Auto-Cal Rate	6
Average interval (VO2max)	30
Test's self-start time	1
Print tabular results	NO
Printer Quality	Normal
Date Type	dd-mm-yyyy

Fitmate/Fitmate GS

✕ Cancel OK Confirm	
Temperature(°C)	25
Temp. Flowm.(°C)	34
RMR, Resp. Quotient x100	85
Auto-Cal Rate	6
Average interval (VO2max)	30
Test's self-start time	1
Training Zones Mode	Fitness
Print tabular results	NO
Printer Quality	Normal
Date Type	dd-mm-yyyy
Print Zones	YES

Fitmate Pro

✕ Cancel OK Confirm	
Temperature(°C)	25
Temp. Flowm.(°C)	34
RMR, Resp. Quotient x100	85
Auto-Cal Rate	6
Average interval (VO2max)	30
Test's self-start time	1
VO2Max Report	Clinical
Print tabular results	NO
Printer Quality	Normal
Date Type	dd-mm-yyyy
Print Zones	YES
Cholesterol	mmol/l

Fitmate Med

Different settings can be modified from this menu (more information is available at the bottom of the Fitmate screen):

- The room temperature
- The flowmeter temperature (we suggest to keep the value at 34°C)
- The default value of the respiratory quotient (R), if known (only used during RMR test)
- Time interval between two consecutive automatic calibrations (in minutes)
- The average time for data display (in seconds, only for VO₂max tests)
- Time interval before the automatic start of the test (in minutes)
- The printout settings for the VO₂max test (only Fitmate Med)
- The Training Zones Mode (only Fitmate Pro)
- Enable/disable all the steps in the report
- The print quality (low, normal or high). The battery will run out faster if the quality is increased.
- The date format (dd-mm-yyyy or mm-dd-yyyy)
- Enable/disable the printing of training zones (only Fitmate Pro/Med)
- The units for cholesterol (only Fitmate Med)

► Restore factory settings

Select this entry to restore the manufacturer settings.

► Activate Fitmate

Select this entry to enter the activation code (see the Registration procedure).

► Training zones settings (only Fitmate Pro/Med)

Fitness training zones

Select this entry to set the training zones (percentage of VO₂max) to obtain:

- optimal fat burning

- endurance training
- anaerobic threshold improvement
- VO₂max improvement

Values to be entered are the minimum and maximum percentage of VO₂max for each zone. Please note that the minimum values for the zones after the first zone are automatically calculated starting from the maximum value of the previous zone, and cannot be modified.

Rehabilitation training zones (Fitmate Med only)

The rehabilitation training zones menu can be accessed only if the VO₂Max report (in **Options/Advanced**) is set to Clinical.

X Cancel OK Confirm		
	Min (%VO ₂ R)	Max (%VO ₂ R)
Very light	10	24
Light	25	44
Moderate	45	59
Heavy	60	84

Select this field to set the training zones (percentage of VO₂reserve) to obtain:

- very light physical activity
- light physical activity
- moderate physical activity
- heavy physical activity

Values to be entered are the minimum and maximum percentage of VO₂reserve for each zone. Please note that the minimum values for the zones after the first zone are automatically calculated starting from the maximum value of the previous zone, and cannot be modified.

Elite training zones (Fitmate Pro only)

X Cancel OK Confirm		
	Min (%VO ₂ Max)	Max (%VO ₂ Max)
Fat Burn.	35	55
Endurance	56	80
Thresh.	81	90
Race Pace	91	95
VO ₂ max	96	100
Supramax	101	105
Ideal training zone for optimal fat burning, low intensity. Specify the criteria as a percentage of measured VO ₂ max		

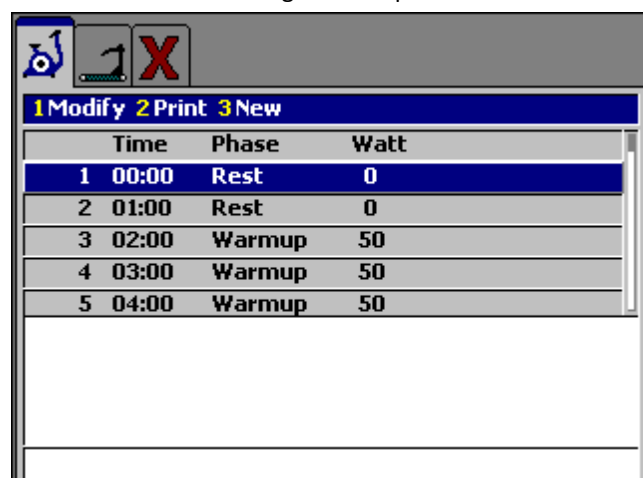
Select this entry to set the training zones (percentage of VO₂max) to obtain:

- optimal fat burning
- endurance training
- anaerobic threshold improvement
- Race Pace
- VO₂max improvement
- Supramax (reserved to experienced and top athletes)

Values to be entered are the minimum and maximum percentage of VO₂max for each zone. Please note that the minimum values for the zones after the first zone are automatically calculated starting from the maximum value of the previous zone, and cannot be modified.

► Customize protocols (only Fitmate Pro/Med)

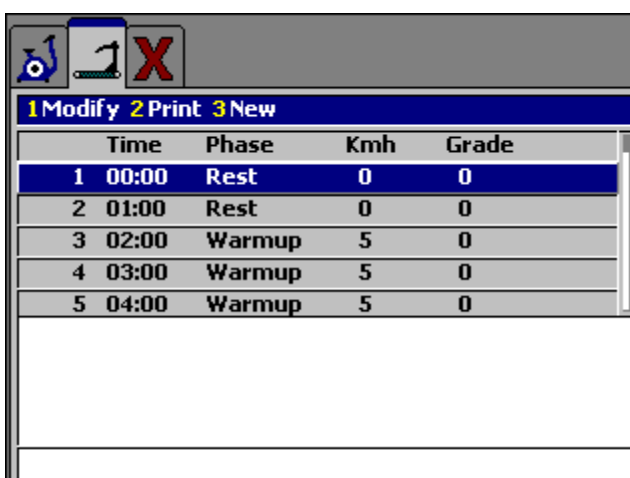
Fitmate allows customizing exercise protocols both for bikes and for treadmills.



1 Modify 2 Print 3 New

	Time	Phase	Watt
1	00:00	Rest	0
2	01:00	Rest	0
3	02:00	Warmup	50
4	03:00	Warmup	50
5	04:00	Warmup	50

Bikes



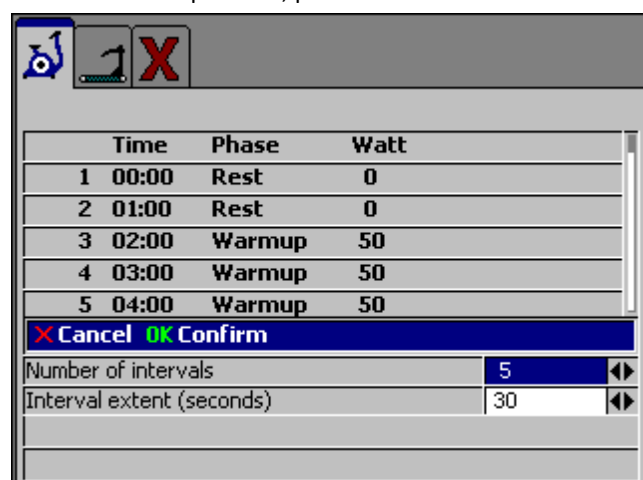
1 Modify 2 Print 3 New

	Time	Phase	Kmh	Grade
1	00:00	Rest	0	0
2	01:00	Rest	0	0
3	02:00	Warmup	5	0
4	03:00	Warmup	5	0
5	04:00	Warmup	5	0

Treadmills

Select the device by means of the arrows.

To create a new protocol, press **3**.



1 Modify 2 Print 3 New

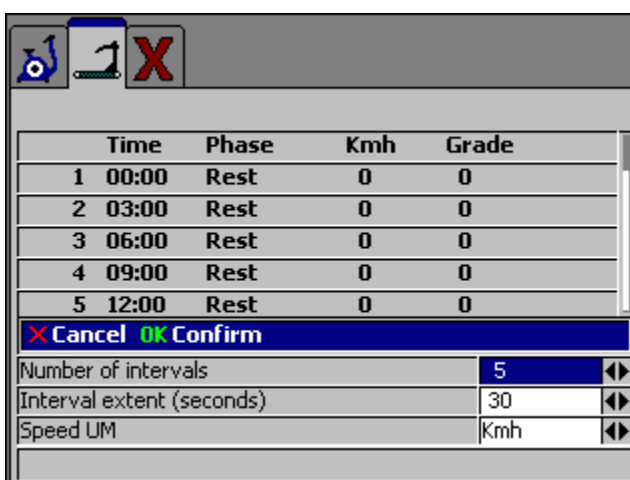
	Time	Phase	Watt
1	00:00	Rest	0
2	01:00	Rest	0
3	02:00	Warmup	50
4	03:00	Warmup	50
5	04:00	Warmup	50

✕ Cancel OK Confirm

Number of intervals: 5

Interval extent (seconds): 30

Bikes



1 Modify 2 Print 3 New

	Time	Phase	Kmh	Grade
1	00:00	Rest	0	0
2	03:00	Rest	0	0
3	06:00	Rest	0	0
4	09:00	Rest	0	0
5	12:00	Rest	0	0

✕ Cancel OK Confirm

Number of intervals: 5

Interval extent (seconds): 30

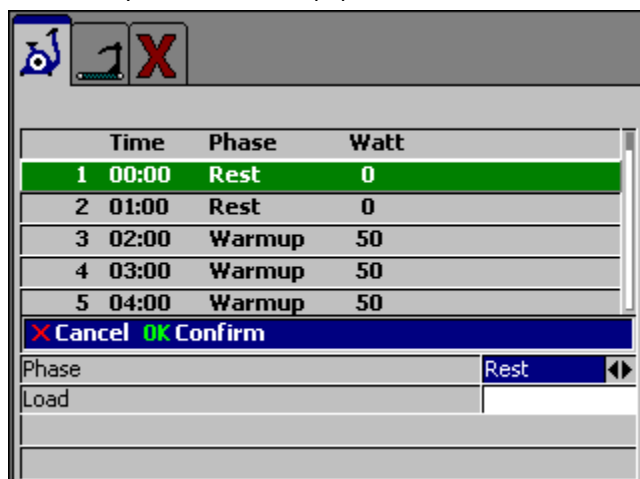
Speed UM: Kmh

Treadmills

Select the number of intervals and their duration (for bikes) or the number of intervals, their duration and the measurement unit of the speed (for treadmills), and press **OK** to confirm or **X** to cancel.

Then, it is possible to modify the steps in order to complete the creation of the desired protocol.

To modify the selected step, press **1**.



1 Modify 2 Print 3 New

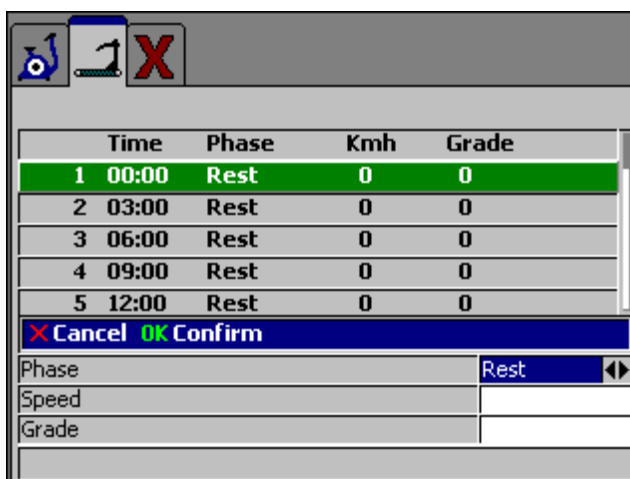
	Time	Phase	Watt
1	00:00	Rest	0
2	01:00	Rest	0
3	02:00	Warmup	50
4	03:00	Warmup	50
5	04:00	Warmup	50

✕ Cancel OK Confirm

Phase: Rest

Load:

Bikes



1 Modify 2 Print 3 New

	Time	Phase	Kmh	Grade
1	00:00	Rest	0	0
2	03:00	Rest	0	0
3	06:00	Rest	0	0
4	09:00	Rest	0	0
5	12:00	Rest	0	0

✕ Cancel OK Confirm

Phase: Rest

Speed:

Grade:

Treadmills

Select the phase and the load (for bikes) or the phase, the speed and the grade (for treadmills), and press **OK** to confirm or **X** to cancel.

To print the protocol, press **2**.

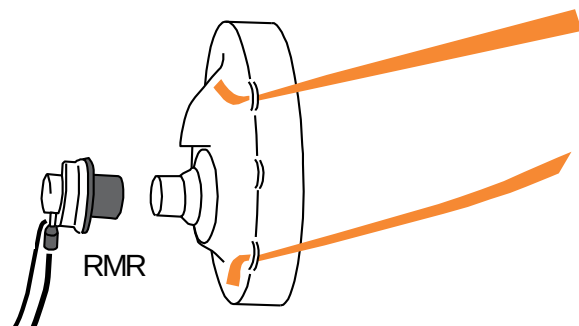
Exit from this dialog selecting the red **X** by means of the arrows.

The RMR test with face mask

► Setting-up and RMR test

Preparing the Fitmate

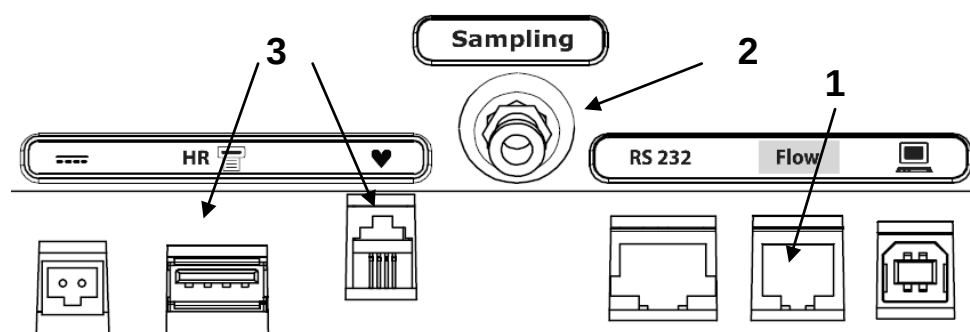
Connect the RMR mask to the RMR reader.



Connect the optoelectronic reader cable to the connection labelled “Turb” on the rear panel of the Fitmate (1).

Connect the permasure sampling line to the socket labelled *Sampling* located on the rear panel of the Fitmate (2).

If you are monitoring the subject’s HR (only Fitmate Pro/Med), place the HR belt on the subject’s chest and connect the HR probe to the proper outlet located on the rear panel of the Fitmate (3).



HR measurement at rest is useful in order in determining if the subject is relaxed during the test.

Preparing the Subject

Ensure the subject is healthy enough to perform the test according to the guidelines.

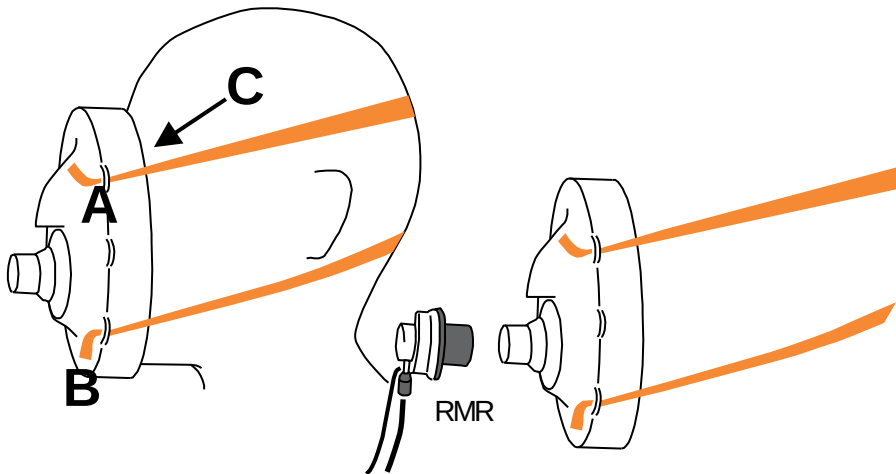
Have the subject relax in a chair or lay down on a bed.

Attach the mask to the subject as illustrated in the picture below. Pull the elastic cords (Point A and B) tightly in order to eliminate possible leaks. The mask needs to be air-tight. Leaks will likely occur near the nose (point C).

Finding the perfect fit for each subject will take practice as each person has different anatomical features which will change the adjustments that need to be made.

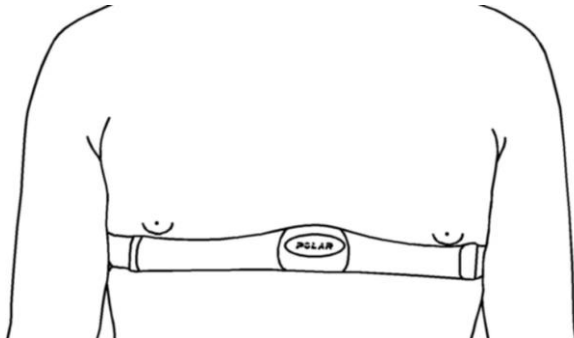
Caution: If the subject has recently exercised, eaten a large meal, or is not relaxed during the test, the RMR values will likely be higher than the subject’s actual RMR and the test should be repeated at a later time.

Caution: If there is a leak during the test (typically the nose or mouth), the results will be lower than the subject’s actual RMR and the test should be repeated.



When monitoring HR (Fitmate Pro/Med only), use the belt and follow the instructions below.

1. Attach the Transmitter to the elastic strap.
2. Adjust the strap to fit tightly and comfortably.
3. Secure the strap around the subject's chest, below the breasts and lock the buckle.



4. Without detaching the elastic strap, pull the transmitter away from the subject's body exposing the two grooved areas that are located on the inside of the transmitter. Wet the grooved electrode areas with saliva, contact lens solution or any other saline solution. Return to its original position against the subject's skin.
5. After wetting the electrodes, do not slide the transmitter around on your body as this can dry the electrodes.

It is recommended that the subject wears the transmitter against bare skin to ensure accurate data acquisition. If the transmitter is worn over a shirt, the shirt needs to be wet under the electrode area to ensure proper conductivity.

In order to have a good HR signal, we suggest to put the HR receiver as close as possible to the HR belt. If the signal is poor, although the belt is properly positioned, adjust the position of the HR probe.

► Test execution

Note: Mobile phones should be turned off prior to testing to eliminate potential interference.

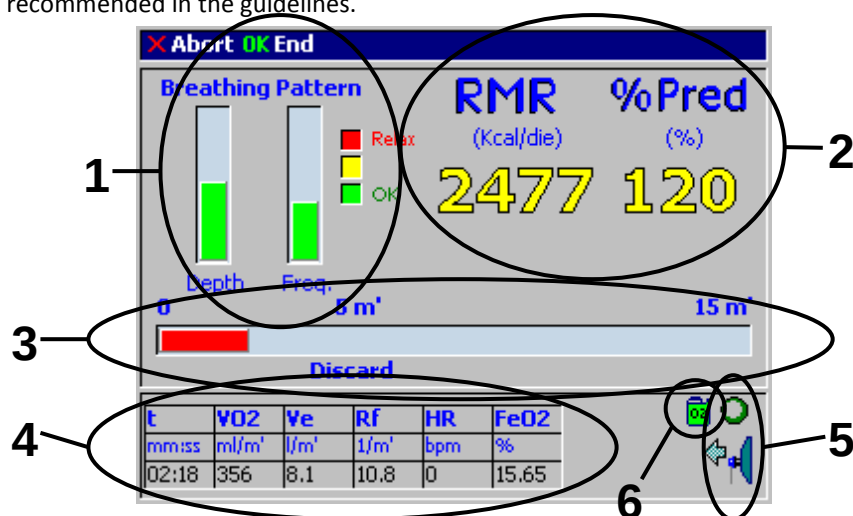
Verify that in **3.Options/3.RMR Mask** is selected.

X Cancel OK Confirm	
Initial discarded interval (m')	5
Averaged interval (m')	10
End test auto print	YES
Print RMR Diagram	NO
Start/End auto detection	NO
Test Mode	Mask

Select **Resting Metabolic Rate** from the test menu. The equipment will automatically calibrate the analyzer. The test will start immediately after the calibration is over.

During the first phase, no data is stored. Use this time to check whether the equipment is working properly, to verify the detection of HR (if used) and to get the subject familiar with the equipment. Press **1.Start** to start the test after you have ensured that all data collected is accurate and physiological. If you do not press start, the test will automatically begin after one minute.

Perform the test as recommended in the guidelines.



During the test, several variables are displayed on the screen. The above picture is an example of what is visible during the test:

- The breathing rate and depth are displayed as the two vertical bars in the top left corner of the screen (1). The color indicates if the breathing rate and depth are OK (green), slightly fast/deep (yellow), too fast/deep (red, need to relax). It is recommended that the subject does not watch the screen to eliminate any external influence.
- The value of RMR and percent of predicted is displayed in the upper right part of the screen (2).
- The horizontal bar (3) indicates the elapsed time: the first several minutes are red and are automatically discarded from the RMR calculation. When the bar changes to blue, an audible signal alerts the user that the data acquisition for the RMR calculation has been started. The duration of each phase can be adjusted by selecting **3.Options/3.RMR**
- The instantaneous values of Oxygen uptake (VO_2), Ventilation (Ve), Respiratory frequency (Rf), heart rate if available (HR) and fraction of O_2 expired (FeO_2) are displayed in the bottom of the screen (4).
- The bottom right corner of the screen shows (5) an icon which becomes green during the automatic calibration of the O_2 sensor a small mask with arrows indicating the inspiration and expiration phases, and (6) an icon which shows the O_2 sensor status during the last calibration (including the ones automatically performed during the test).

If the user selects **3.Options** (see the related section of this manual), the following settings can be modified:

- The duration of the test phase to discard (5 minutes by default)
- The duration of the data acquisition phase (10 minutes by default)
- If the test is automatically printed at the end of the test
- If the RMR graph must be printed together with the test results
- If enable/disable the automatic detection of start/end of the test
- The interval time between two consecutive O_2 sensor calibration (6 minutes by default)
- The respiratory quotient (0.85 by default)
- To print all steps after a test or none

When the test is over (15 minutes) a new window will automatically open showing the test result and a report will automatically be printed.

X Exit 1 Test 2 Print 3 Print all
 James Bond 12/22/2005-12/22/2005
 RMR

Resting Metabolic Rate
 Date (mm-dd-yyyy) 12/22/2005
 Pb (mmHg) 740
 STPD 0.8029
 Test length (mm:ss) 10:00

RMR %Pred
 (Kcal/day) (%)
2292 111

Automatic detection of the start/end of the test

If selected by the user, the unit can use the coefficient of variation of V_e and RMR in order to detect the start and the end of the test even if the predefined time interval is not elapsed.

In this case, when a steady state is reached (but not before 3 minutes), the display shows the following:

X Abort OK End
 Breathing Pattern RMR %Pred
 (Kcal/day) (%)
1964 114
 Relax OK
 Depth Freq. 0 5 m' 15 m'
 Steady State Achieved. Skip to second phase?
 1 Confirm X Ignore
 t
 mm:ss ml/min l/min 1/min bpm %
 03:01 282 7.6 12.0 65 16.53

Press 1 to confirm the start of the data acquisition phase, or X to ignore and to continue with the first phase.

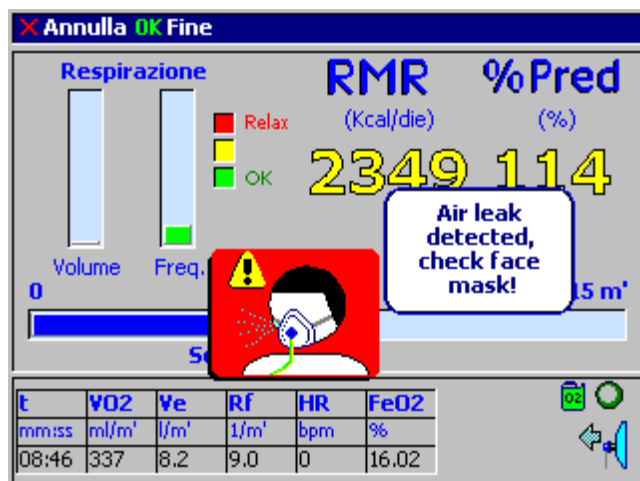
In the same way, when the test can be ended (but not before 5 minutes), the display shows the following:

X Abort OK End
 Breathing Pattern RMR %Pred
 (Kcal/day) (%)
1955 113
 Relax OK
 Depth Freq. 0 4 m' 15 m'
 Enough data collected. Stop the test?
 1 Confirm X Ignore
 t
 mm:ss ml/min l/min 1/min bpm %
 09:31 281 7.6 12.0 65 16.55

Press 1 to confirm the end of the test, or X to ignore and to continue the test.

Problems during the test execution

The equipment has internal sensors which detects potential problems during test execution (e.g. air leaks, subject not adequately relaxed, O_2 not detected). If a problem arises, a warning message will appear on the screen. The steps where the errors occur will be marked as "invalid" in the printout report and will be discarded from the final calculation.



Resting Metabolic Rate

t	VO2	Ve	Rf	HR	FeO2	RMR
mm:ss	ml/m'	l/m'	l/m'	bpm	%	kcal/day
00:30	486	12.6	13.2	66	16.40	3386
01:00	428	12.1	13.7	66	16.76	2983
01:30	542	14.4	14.8	68	16.50	3774
02:00	460	12.8	14.2	65	16.72	3200
02:30	359	11.7	15.1	61	17.32	2503
03:00	296	10.3	14.7	63	17.56	2063

03:30	379	11.8	14.0	64	17.16	2641
04:00	357	11.2	15.1	63	17.17	2488
04:30	186	13.0	13.9	66	19.25	1292
05:00	57	12.0	14.9	65	20.38	395
05:30	0	0.0	0.0	0	0.00	0
06:00	286	10.6	16.7	68	17.75	1989
06:30	335	11.0	14.0	62	17.34	2332
07:00	338	11.6	16.1	66	17.50	2351
07:30	429	13.1	13.8	67	17.08	2990
08:00	360	11.4	14.7	66	17.22	2507
08:30	299	9.0	20.5	69	17.02	2084
09:00	365	11.2	16.3	67	17.09	2541
09:30	342	10.9	15.8	71	17.24	2379

06:30	349	11.2	15.7	66	17.26	2430

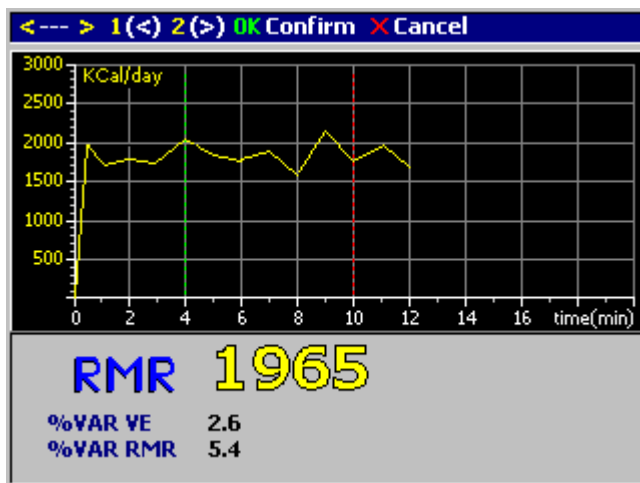
Non valid steps

If a wrong mode is selected (i.e. it is selected Canopy mode and the RMR test is performed with the mask), the following message will appear during the test, the test must be stopped, the proper option must be selected and the test must be restarted.



Average interval selection

At the end of the test, a graph is shown:



The user can graphically modify the start and the end of the average interval.

- Press **1** and the arrows to move the start cursor
- Press **2** and the arrows to move the end cursor

Press **OK** to confirm, **X** to cancel.

Each time the cursor is moved, the RMR value and the coefficients of variation are recalculated.

► Printout interpretation

Below the header and the subject's data, in the *Resting metabolic rate* section is reported: the RMR graph (if the option is enabled), all the test steps (if the option is enabled), the final result, the coefficients of variation for V_e and VO_2 , a graph showing the test result and its % in comparison with the predicted value (calculated by means of the Harris Benedict formula for age over 18 years or Schofield formula for age up to 18 years).

The test section is divided into three parts:

- Section one refers to the test data which will be discarded and not used in interpretation
- Section two refers to the RMR test data considered in the calculation
- Section three summarizes the test results.

The columns of the first and second part indicate:

Column	Data
t (mm:ss)	The time of the step
VO ₂ (ml/min)	The average oxygen consumption (in ml per minute) during the last 30 seconds
V _e (l/min)	The average ventilation (in liters per minute) during the last 30 seconds
R _f (1/min)	The average respiratory frequency during the last 30 seconds
HR (bpm)	The average heart rate (if measured) during the last 30 seconds
FeO ₂ (%)	The average oxygen concentration during the exhaled (in the last 30 seconds)
RMR (kcal/day)	The RMR value, calculated starting from the oxygen consumption during the last 30 seconds

The columns of the third section indicate:

Column	Data
t (mm:ss)	The duration of the second phase of the test
VO ₂ (ml/min)	The average oxygen consumption (in ml per minute)
V _e (l/min)	The average ventilation (in liters per minute)
R _f (1/min)	The average respiratory frequency
HR (bpm)	The average heart rate (if measured)
FeO ₂ (%)	The average oxygen concentration in the exhaled air
RMR (kcal/day)	The RMR value, calculated starting from the oxygen consumption measured during the test

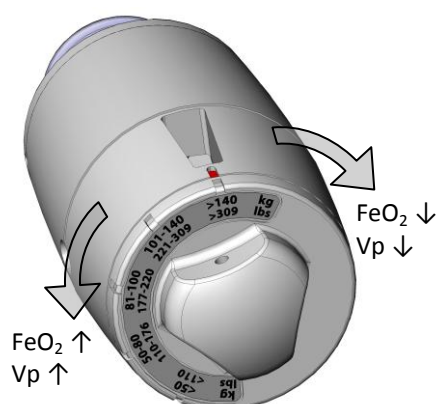
The RMR test with Canopy

The ventilated bubblehood system allows a stream of air to pass across the face of the subject and mix with the air being collected by the transparent hood over the subject's head. The flow rate measurement system will calculate the oxygen consumption and the Energy Expenditure.

Note: Cellular phones should be turned off to eliminate potential electrical interferences.

► Warnings and recommendations

1. Do not measure a comatose or incapacitated patient with the canopy.
2. Constant attention by a qualified individual is required whenever a patient is measured with the canopy. Problems in delivery of fresh gas may pass unnoticed in spite of alarms. Use a pulse oximeter to ensure that the patient is sufficiently oxygenated.
3. Verify (before and during the test) that the FeO_2 falls within the range 19.50%-20.25% and adjust the flow selector on the blower as necessary. If the FeO_2 is too low you should rotate the selector counterclockwise, if the FeO_2 is too high, rotate the selector clockwise. A low FeO_2 could be dangerous for the patient, while a high FeO_2 may result in unreliable measurements.

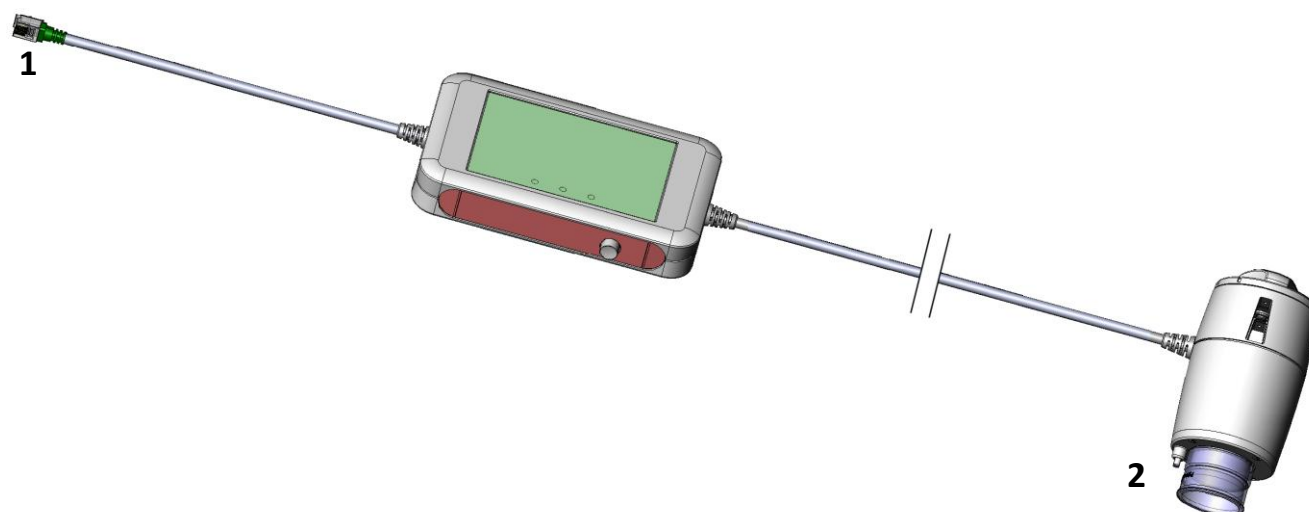


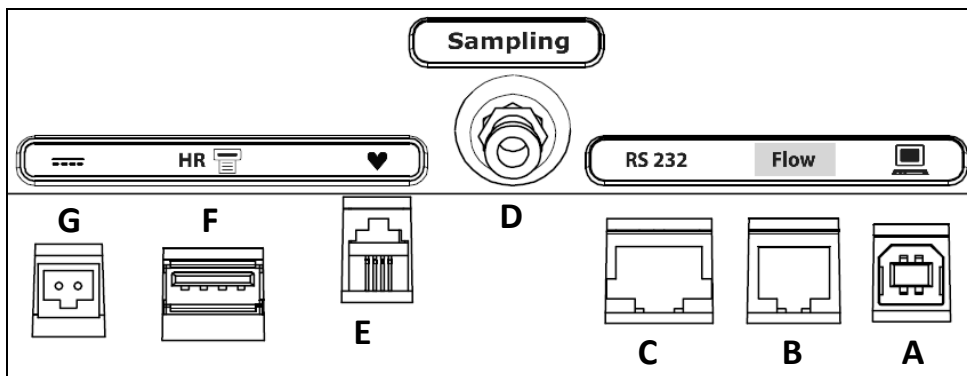
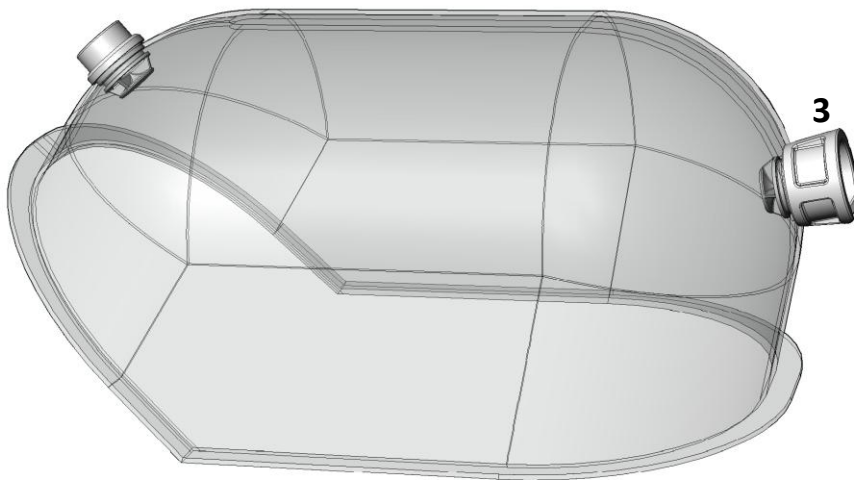
After having changed the selector position, please wait at least 30-45 seconds in order to visualise the variations.

4. Do not place the canopy hood over a patient's head before powering on the unit and applying a continuous flow from the canopy blower.
5. Do not obstruct the ventilation holes on the canopy blower.

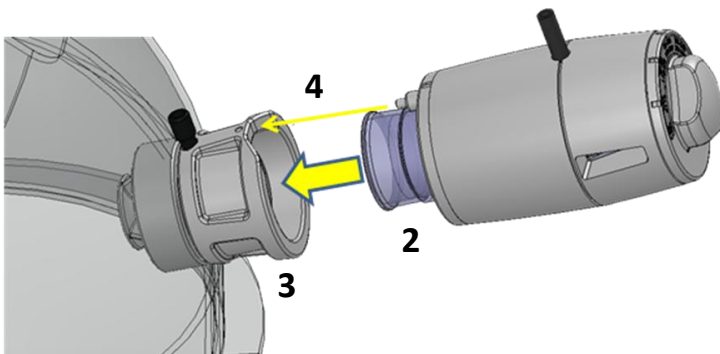
► Setting-up and RMR test

Preparing the Fitmate

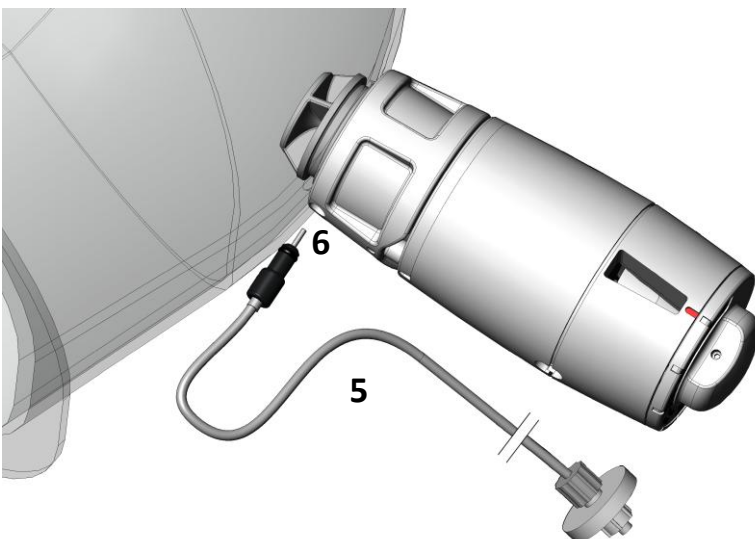




1. Insert the green connector (1) into the Flow connector on the rear side of the Fitmate unit (B)
2. Place the turbine in the Canopy blower (2)
3. Connect the Canopy blower (2) to the hood connector (3), paying attention to let the colored dots (4) coincide



4. Connect the sampling line (5) between the Fitmate (*Sampling* connector, D) and the hole on the hood connector (6).



The Canopy unit is powered only during a test. If you try to turn on the Canopy unit when you are not running a RMR test, the alarm will beep and the red led will blink.

If you are monitoring the subject's HR (only Fitmate Pro/Med), place the HR belt on the subject's chest and connect the HR probe to the proper outlet located on the rear panel of the Fitmate (E or F).

HR measurement at rest is useful in order in determining if the subject is relaxed during the test.

Warnings on batteries

Please follow these warnings about the battery usage in the Canopy unit.

- Use 4 alkaline AA batteries
- Do not use rechargeable batteries
- Pay attention to respect polarity: risk of short circuit
- Do not try to recharge batteries
- Use only alkaline batteries
- When changing batteries, replace all the batteries at the same time: risk of liquid leakage
- Do not use exhausted batteries together with new batteries, or batteries of different brands together
- Exhausted batteries should be immediately removed and properly disposed, according to local regulations
- Remove the batteries if the unit is not used for a long time
- If exhausted batteries are left for a long time in the device, they could leak and damage the device itself
- Do not deform or dismantle the batteries in any way: batteries contain different chemical substances dangerous for skin, eyes, mucosa, etc.
- Store unused batteries in the original package, away from metallic objects: risk of short circuit and damages for the batteries
- Do not put batteries into fire
- Use only recommended batteries
- Clean the battery poles and the battery compartment before insert new batteries

Preparing the Subject

Ensure the subject is healthy enough to perform the test according to the guidelines.

Have the subject relax in a chair or lay down on a bed.

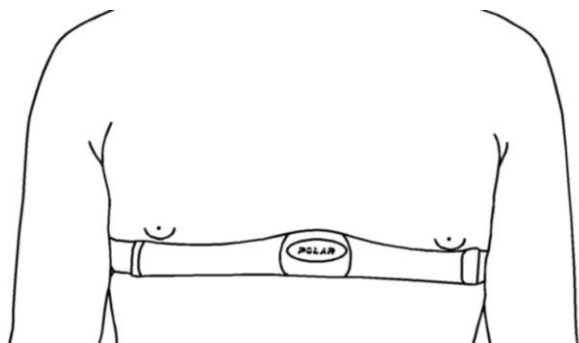
Warning: Do not place the canopy hood on the subject until the test is started

Caution: If the subject has recently exercised, eaten a large meal, or is not relaxed during the test, the RMR values will likely be higher than the subject's actual RMR and the test should be repeated at a later time.

Caution: If there is a leak during the test, the results will be lower than the subject's actual RMR and the test should be repeated.

When monitoring HR (Fitmate Pro/Med only), use the belt and follow the instructions below.

1. Attach the Transmitter to the elastic strap.
2. Adjust the strap to fit tightly and comfortably.
3. Secure the strap around the subject's chest, below the breasts and lock the buckle.



4. Without detaching the elastic strap, pull the transmitter away from the subject's body exposing the two grooved areas that are located on the inside of the transmitter. Wet the grooved electrode areas with saliva, contact lens solution or any other saline solution. Return to its original position against the subject's skin.
5. After wetting the electrodes, do not slide the transmitter around on your body as this can dry the electrodes.

6. It is recommended that the subject wears the transmitter against bare skin to ensure accurate data acquisition. If the transmitter is worn over a shirt, the shirt needs to be wet under the electrode area to ensure proper conductivity.
7. In order to have a good HR signal, we suggest to put the HR receiver as close as possible to the HR belt. If the signal is poor, although the belt is properly positioned, adjust the position of the HR probe.

► Test execution

Note: Mobile phones should be turned off prior to testing to eliminate potential interference.

Verify that in **3.Options/3.RMR Canopy** is selected.

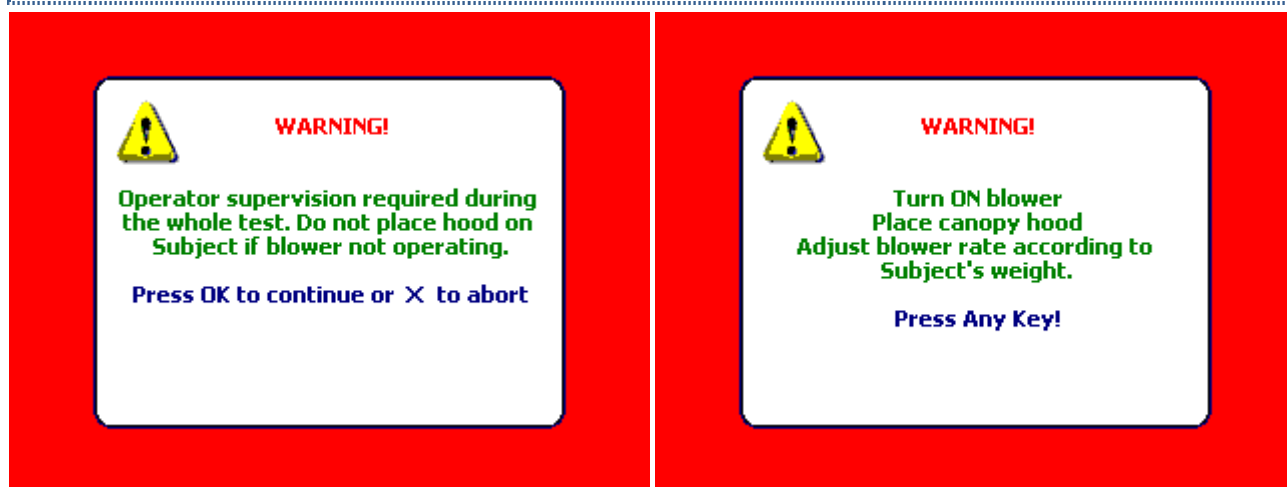
X Cancel OK Confirm	
Initial discarded interval (m')	5
Averaged interval (m')	10
End test auto print	YES ◀▶
Print RMR Diagram	NO ◀▶
Start/End auto detection	NO ◀▶
Test Mode	Canopy ◀▶

During this period, data collected will not be used for evaluation of results.

Adjust the flow selector according to the subject's weight.

Select **Resting Metabolic Rate** from the test menu. The equipment will prompt the following messages.

Warning: Do not place the canopy hood on the subject until the proper message is shown.



When this second message is shown, turn on the canopy unit (4). The red led (1) on the front panel of the unit should flash for few seconds followed by an alarm beep. If the led does not flash and/or the alarm does not beep the test cannot be performed because either the backup batteries are exhausted or there are no backup batteries.



If the yellow led (2) turns on, the backup batteries are exhausted. Do not perform the test. Instead, please turn off the canopy unit and replace the backup batteries.

When the green led (3) turns on you may begin the test. If the green led does not turn on the test cannot be performed because the pump does not work, the system is not powered, the blower is not properly placed, the turbine is damaged or not properly inserted, the ventilation holes are obstructed or another problem exists.

Place the hood with the veil on the patient's head. The canopy blower must be placed near the patient's top head.

Warning: Do not place the canopy hood over a patient's head before the blower is on, powered, a continuous flow has been applied from the canopy blower and the green led is on.

After having confirmed the second prompt, the equipment will automatically calibrate the analyzer. The test will start immediately after the calibration is over.

During the first phase, no data is stored. Use this time to check whether the equipment is working properly, to verify the detection of HR (if used) and to get the subject familiar with the equipment. Press **1.Start** to start the test after you have ensured that all data collected is accurate and physiological. If you do not press start, the test will automatically begin after one minute.

In the first part of the test the flow rate of the pump should be adjusted with the flow selector in order to achieve a FeO₂ between 19.50% and 20.25%.

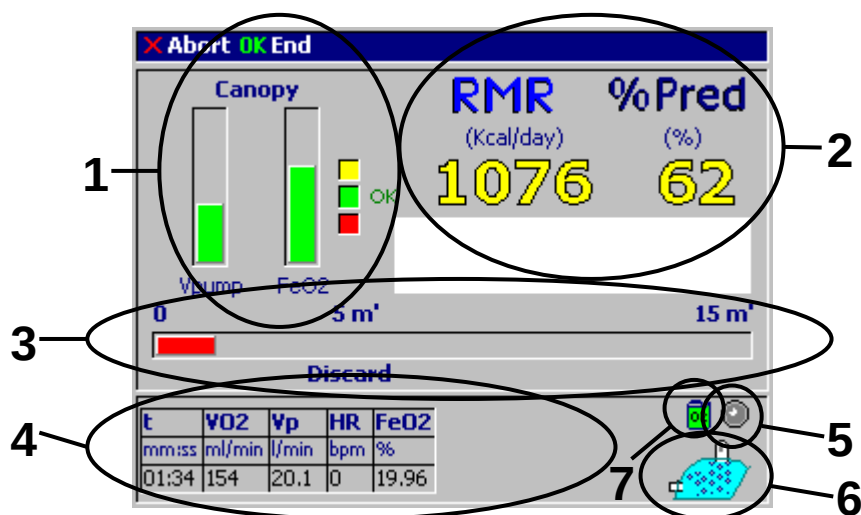
After modifying the flow, please wait at least 30-45 seconds in order to visualise the variations.

FeO ₂	Observations	Warning message on Fitmate	Actions to do
20.70%	Expired oxygen not detected		Check the sampling line and the turbine connections
	Ventilation too high		
20.25%	Good test		NOTHING
	Ventilation too low: danger		

During the test, you should continue to verify that the measured FeO_2 is within the 19.50%-20.25% range throughout the test and adjust the flow selector as necessary.

Warning: If the green led turns off during the test, the red led flashes or the alarm beeps you should abort the test and remove the hood from the patient's head. This could indicate that: the pump doesn't work, the system is not powered, the blower is not properly placed, the turbine is damaged or not properly inserted, the ventilation holes are obstructed or another problem exists. If the system is not powered, the pump is being powered by the backup battery, but the test must be stopped.

Perform the test as recommended in the guidelines.



During the test, several variables are displayed on the screen. The above picture is an example of what is visible during the test:

- The pump ventilation and the FeO_2 are displayed as the two vertical bars in the top left corner of the screen (1). The color of the FeO_2 indicates if the diluted oxygen concentration is OK (green), too high (yellow, need to decrease the pump ventilation), too low (red, need to increase the pump ventilation).
- The value of RMR and percent of predicted is displayed in the upper right part of the screen (2).
- The horizontal bar (3) indicates the elapsed time: the first several minutes are red and are automatically discarded from the RMR calculation. When the bar changes to blue, an audible signal alerts the user that the data acquisition for the RMR calculation has been started. The duration of each phase can be adjusted by selecting **3.Options/3.RMR**
- The instantaneous values of Oxygen uptake (VO_2), Pump ventilation (V_p), heart rate if available (HR) and fraction of O_2 diluted in the hood (FeO_2) are displayed in the bottom of the screen (4).
- The bottom right corner of the screen shows (5) an icon which becomes green during the automatic calibration of the O_2 sensor, a bubblehood (6) indicating that the test is proceeding, and (7) an icon which shows the O_2 sensor status during the last calibration (including the ones automatically performed during the test).



The bubblehood icon changes to  (alternating) to indicate that the ventilation is not detected.

If the user selects **3.Options** (see the related section of this manual), the following settings can be modified:

- The duration of the test phase to discard (5 minutes by default)
- The duration of the data acquisition phase (10 minutes by default)
- If the test is automatically printed at the end of the test
- If the RMR graph must be printed together with the test results
- If enable/disable the automatic detection of start/end of the test
- The interval time between two consecutive O_2 sensor calibration (6 minutes by default)
- The respiratory quotient (0.85 by default)
- To print all steps after a test or none

When the test is over (15 minutes by default) a prompt warns the operator to remove the hood from the patient and to turn off the Canopy unit.

Remove the hood from the patient. Turn off the Canopy unit. Press OK to confirm.

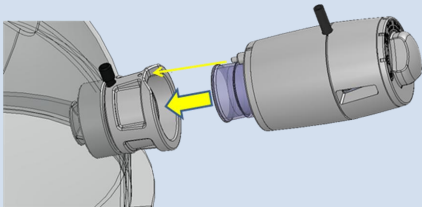
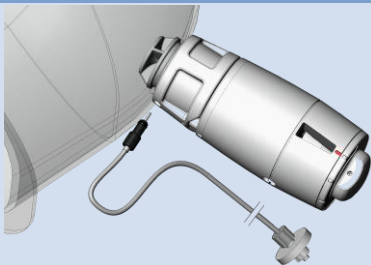
A new window will automatically open showing the test result and a report will automatically be printed.

X Exit 1 Test 2 Print 3 Print all
 James Bond 12/22/2005-12/22/2005
 CANOPY
 Canopy
 Date(dd-mm-yyyy) 12/22/2005
 Pb (mmHg) 747
 STPD 0.8110
 Test length (mm:ss) 10:00
 RMR %Pred
 (Kcal/day) (%)
 2292 111

Note: Always remember to turn off the Canopy at the end of the working session.

Summary on test execution

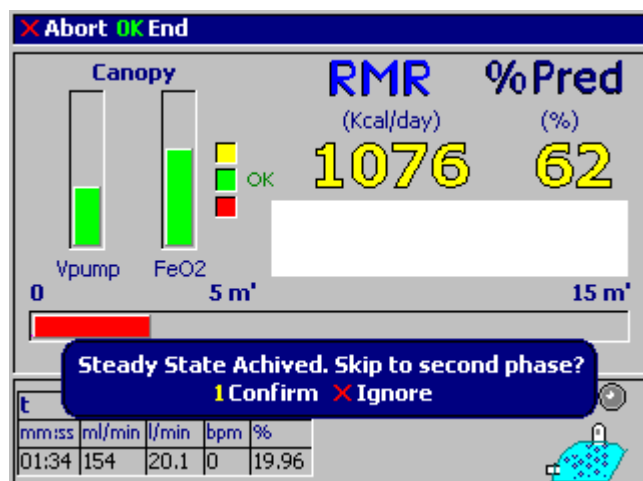
Here follows a table with a graphic summary on the main steps of the Canopy test. Be sure to carefully read the previous instructions in order to be aware of all the warnings, cautions and dangers related to the test execution.

Step #	Description	Step #	Description															
1		2																
3		4	✕ Cancel OK Confirm <table><tr><td>Initial discarded interval (m')</td><td>5</td></tr><tr><td>Averaged interval (m')</td><td>10</td></tr><tr><td>End test auto print</td><td>YES</td></tr><tr><td>Print RMR Diagram</td><td>NO</td></tr><tr><td>Start/End auto detection</td><td>NO</td></tr><tr><td>Test Mode</td><td>Canopy</td></tr></table> During this period, data collected will not be used for evaluation of results.	Initial discarded interval (m')	5	Averaged interval (m')	10	End test auto print	YES	Print RMR Diagram	NO	Start/End auto detection	NO	Test Mode	Canopy			
Initial discarded interval (m')	5																	
Averaged interval (m')	10																	
End test auto print	YES																	
Print RMR Diagram	NO																	
Start/End auto detection	NO																	
Test Mode	Canopy																	
5	DEMO P. Select 1 Standard Measurements 2 Spirometry & SpO2 3 Resting Metabolic Rate 4 Body Composition 5 Energy Balance 6 Cardio Respiratory Fitness 7 Risk analysis	6	WARNING! Operator supervision required during the whole test. Do not place hood on Subject if blower not operating. Press OK to continue or ✕ to abort															
		7	WARNING! Turn ON blower Place canopy hood Adjust blower rate according to Subject's weight. Press Any Key!															
8	✕ Abort OK End Canopy RMR %Pred (Kcal/day) (%) 1076 62 Vpump FeO2 0 5 m' 15 m' Discard <table><tr><th>t</th><th>VO2</th><th>Vp</th><th>HR</th><th>FeO2</th></tr><tr><th>mm:ss</th><th>ml/min</th><th>l/min</th><th>bpm</th><th>%</th></tr><tr><td>01:34</td><td>154</td><td>20.1</td><td>0</td><td>19.96</td></tr></table>	t	VO2	Vp	HR	FeO2	mm:ss	ml/min	l/min	bpm	%	01:34	154	20.1	0	19.96	9	✕ Exit 1 Test 2 Print 3 Print all James Bond 12/22/2005-12/22/2005 CANOPY Canopy Date(dd-mm-yyyy) 12/22/2005 Pb (mmHg) 747 STPD 0.8110 Test length (mm:ss) 10:00 RMR %Pred (Kcal/day) (%) 2292 111
t	VO2	Vp	HR	FeO2														
mm:ss	ml/min	l/min	bpm	%														
01:34	154	20.1	0	19.96														

Automatic detection of the start/end of the test

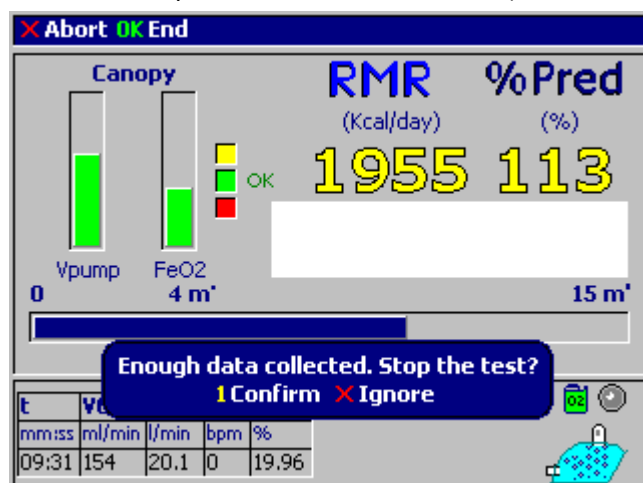
If selected by the user, the unit can use the coefficient of variation of V_e and RMR in order to detect the start and the end of the test even if the predefined time interval is not elapsed.

In this case, when a steady state is reached (but not before 3 minutes), the display shows the following:



Press **1** to confirm the start of the data acquisition phase, or **X** to ignore and to continue with the first phase.

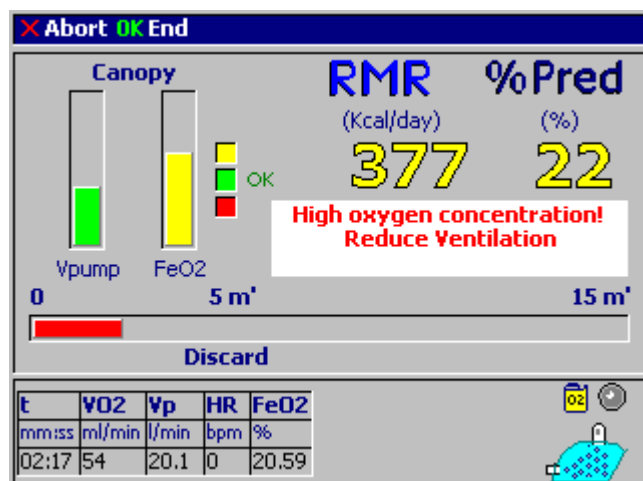
In the same way, when the test can be ended (but not before 5 minutes), the display shows the following:



Press **1** to confirm the end of the test, or **X** to ignore and to continue the test.

Problems during the test execution

The equipment has internal sensors which detects potential problems during test execution (e.g. ventilation not detected, exhaled oxygen not detected, high or low oxygen concentration). If a problem arises, a warning message will appear on the screen. The steps where the errors occur will be marked as "invalid" in the printout report and will be discarded from the final calculation.

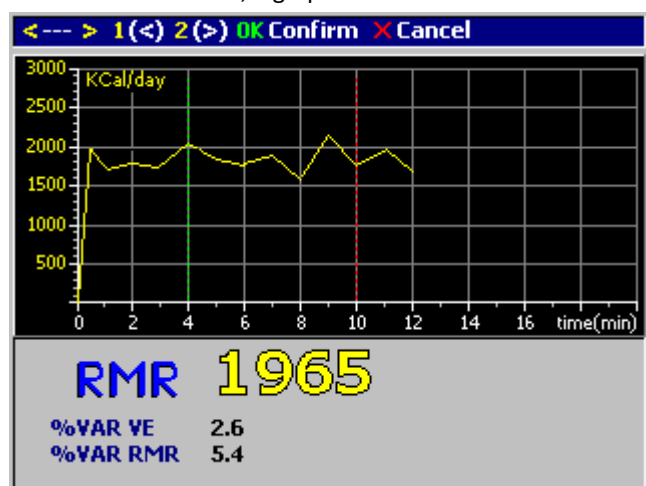


If a wrong mode is selected (i.e. it is selected mask mode and the RMR test is performed with the Canopy), the following message will appear during the test, the test must be stopped, the proper option must be selected and the test must be restarted.



Average interval selection

At the end of the test, a graph is shown:



The user can graphically modify the start and the end of the average interval.

- Press **1** and the arrows to move the start cursor
- Press **2** and the arrows to move the end cursor

Press **OK** to confirm, **X** to cancel.

Each time the cursor is moved, the RMR value and the coefficients of variation are recalculated.

► Printout interpretation

Below the header and the subject's data, in the *Canopy* section is reported: the RMR graph (if the option is enabled), all the test steps (if the option is enabled), the final result, the coefficients of variation for V_p and VO_2 , a graph showing the test result and its % in comparison with the predicted value (calculated by means of the Harris Benedict formula for age over 18 years or Schofield formula for age up to 18 years).

The test section is divided into three parts:

- Section one refers to the test data which will be discarded and not used in interpretation
- Section two refers to the RMR test data considered in the calculation
- Section three summarizes the test results.

The columns of the first and second part indicate:

Column	Data
t (mm:ss)	The time of the step
VO_2 (ml/min)	The average oxygen consumption (in ml per minute) during the last 30 seconds

Vp (l/min)	The average pump ventilation (in liters per minute) during the last 30 seconds
HR (bpm)	The average heart rate (if measured) during the last 30 seconds
FeO2 (%)	The average oxygen concentration in the hood (in the last 30 seconds)
RMR (kcal/day)	The RMR value, calculated starting from the oxygen consumption during the last 30 seconds

The columns of the third section indicate:

Column	Data
t (mm:ss)	The duration of the second phase of the test
VO2 (ml/min)	The average oxygen consumption (in ml per minute)
Vp (l/min)	The average pump ventilation (in liters per minute)
HR (bpm)	The average heart rate (if measured)
FeO2 (%)	The average oxygen concentration in the hood
RMR (kcal/day)	The RMR value, calculated starting from the oxygen consumption measured during the test

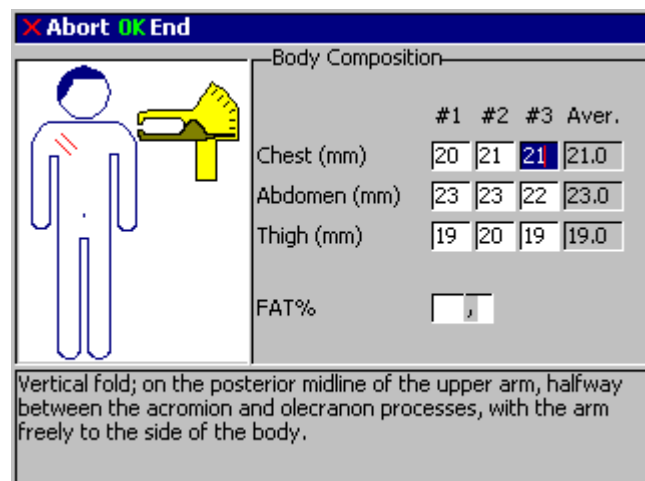
Body composition

► Test execution and data entry

Select **Body Composition** from the Test menu and start a test.

Case A: The percentage of FAT is unknown and/or it is necessary to measure it

With the navigator tool move to the desired field: *Chest*, *Abdomen* and *Thigh*, and perform all the measurements with the skin fold calliper following the instructions at the bottom of the screen. The picture on the screen illustrates each of the measurements.



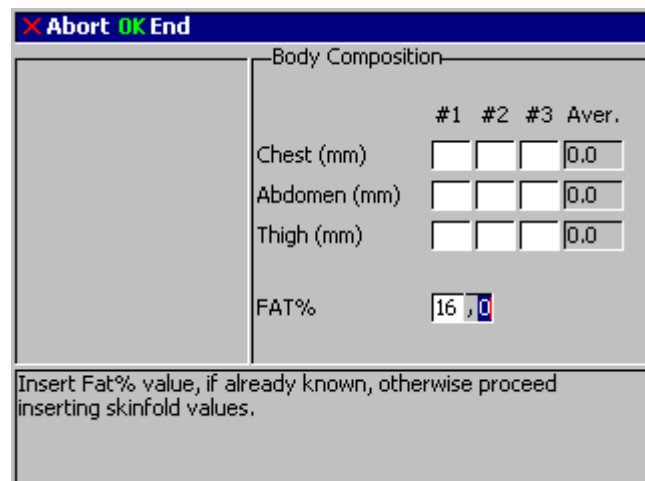
	#1	#2	#3	Aver.
Chest (mm)	20	21	21	21.0
Abdomen (mm)	23	23	22	23.0
Thigh (mm)	19	20	19	19.0
FAT%				

Vertical fold; on the posterior midline of the upper arm, halfway between the acromion and olecranon processes, with the arm freely to the side of the body.

Note: the values are averaged after discarding the most variable data.

Case B: the percentage of FAT is known

Enter the values in the corresponding field (FAT%) and press **OK**, to confirm



	#1	#2	#3	Aver.
Chest (mm)				0.0
Abdomen (mm)				0.0
Thigh (mm)				0.0
FAT%	16			0

Insert Fat% value, if already known, otherwise proceed inserting skinfold values.

Viewing the results

When all the fields are filled in press **OK** to confirm, both in case A and B a new window will display the result of the Body Composition test.

X Exit 1 Test 2 Print 3 Print all	
James Bond 12/22/2005-12/22/2005	
RMR	Body Composition
BODY COMP.	Date (mm-dd-yyyy) 12/22/2005
	Chest (mm) 21.0 Abdomen (mm) 23.0 Thigh (mm) 19.0 FAT% 19.9 FAT Mass (Kg) 19 Lean Body Mass (Kg) 76

Standard measurement

► Performing the measurement and entering the data

Select **Standard Measurements** from the test menu to start the measurement.

Perform the measurements following the instructions at the screen. They are also illustrated by the picture appearing on the left side of the screen.

If a zero is entered in a field, this value won't be showed neither in the test results nor in the printout.

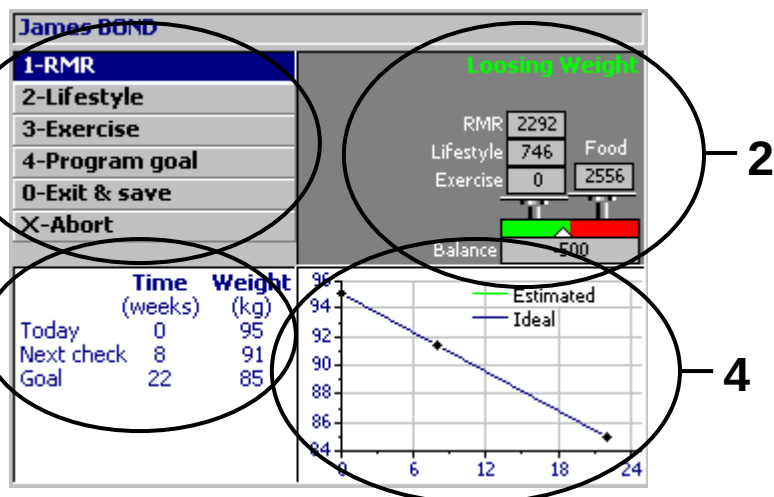
When all the fields are filled-in press **OK** to confirm, a new window will display the results.

Energy balance

► Setting up an energy balance

Select **Energy Balance** from the test menu. A new window will open:

- A menu on the top left side of the screen is used to control the program (1)
- The weight control program is shown on the top right side (2)
- A numeric representation of the program is displayed on the bottom left side (3)
- A graphical representation of the program is displayed on the bottom right side (4).



RMR

It is possible to enter a different RMR value other than the measured value. by selecting **1.RMR**. Press **OK** to confirm or **X** to cancel.

The 'Enter required information' dialog has a yellow header. It contains a menu with '1-RMR' selected. To the right are 'X Cancel' and 'OK Confirm' buttons. Below the menu is a field for 'RMR' with the value '2292' entered. At the bottom, there is a table with the same weight management data as in the main window:

	Time (weeks)	Weight (kg)
Today	0	95
Next check	8	91
Goal	22	85

The weight management program will be automatically updated.

If the current session contains an RMR test, the RMR value is preset to the measured value, even if you have modified this value.

Lifestyle

The energy expenditure influenced by your Lifestyle can be estimated by pressing **2.Lifestyle**

You can:

1. Select lifestyle (Sedentary, normal, active,...)

[illegible]

5. Press **OK** to confirm or **X** to cancel. The program will automatically be updated.

Exercise

To estimate the energy expenditure during exercise, press 3.Exercise and complete the information requested for the specific type of exercise (see table). Press OK to confirm or X to cancel.

Enter required information		
		✖ Cancel ✔ OK Confirm
3-Exercise	Sessions	
	Duration	
	Mode	Walking ▶▶
	Speed	
	Grade	
	Time (weeks) Weight (kg)	The weekly frequency of the specified exercise expenditure (number of sessions per week)
Today	0 95	
Next check	8 91	
Goal	22 85	

Exercise	Required information
Walking	Sessions, duration, speed, grade
Running	Sessions, duration, speed, grade
Leg cycling	Sessions, duration, watt
Arm cycling	Sessions, duration, watt
Stepping	Sessions, duration, rate, step height
Other	Sessions, calories

If more than one exercise is performed, or the exercise performed is not included in the above list, it is possible to select *other* and manually enter the energy expenditure of the specific activity.

The program will automatically be updated.

Goals

To define the goals of a weight management program select **4. Program goal**

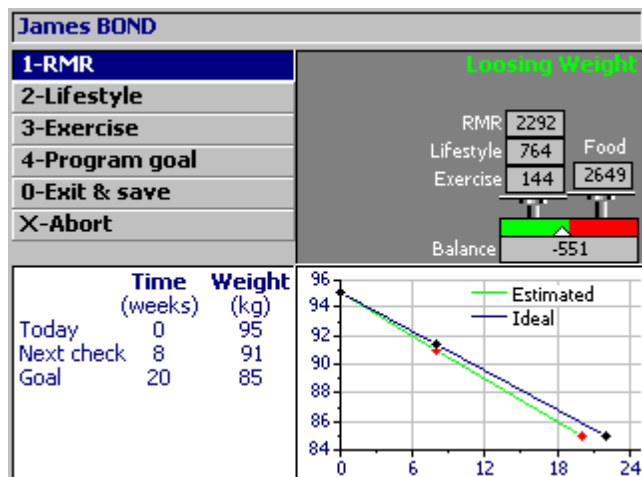
Enter required information													
✖ Cancel OK Confirm													
Weight change (g)	454												
Desired weight (Kg)	85												
4-Program goal	Next check 8												
<table border="1"> <thead> <tr> <th></th> <th>Time (weeks)</th> <th>Weight (kg)</th> </tr> </thead> <tbody> <tr> <td>Today</td> <td>0</td> <td>95</td> </tr> <tr> <td>Next check</td> <td>8</td> <td>91</td> </tr> <tr> <td>Goal</td> <td>22</td> <td>85</td> </tr> </tbody> </table>			Time (weeks)	Weight (kg)	Today	0	95	Next check	8	91	Goal	22	85
	Time (weeks)	Weight (kg)											
Today	0	95											
Next check	8	91											
Goal	22	85											
Weight change per week in grams (Recommended value is 500, and no more than 1000, grams/week)													

Enter the goals:

- Desired weight change per week. Recommended value is 500 grams (1 pound) and to 1000 grams (2 pounds) per week.
- Goal weight
- Date of the next check (time in weeks)

Press **OK** to confirm or **X** to cancel.

The program will automatically be updated.



The graph to the right shows the ideal body weight change (in blue), with a weight loss of 1 pound (454 g) per week, and the desired body change (in green), following the parameters entered previously.

If the subject's goal is to gain weight, set the desired weight greater than the present weight and the title will be Gaining Weight.

Viewing the program

If pressing **0.Exit & save**, the new weight management program will be displayed on the screen. From here, you can print the weight management program.

✖ Exit 1 Test 2 Print 3 Print all													
James Bond 12/22/2005-12/22/2005													
RMR BODY COMP. STD. MEAS. EN.BALANCE	Energy Balance Date (mm-dd-yyyy) 12/22/2005 <table border="1"> <thead> <tr> <th></th> <th>Time (weeks)</th> <th>Weight (kg)</th> </tr> </thead> <tbody> <tr> <td>Today</td> <td>0</td> <td>95</td> </tr> <tr> <td>Next check</td> <td>8</td> <td>91</td> </tr> <tr> <td>Goal</td> <td>20</td> <td>85</td> </tr> </tbody> </table> RMR 2292 Lifestyle 764 Exercise 144 Food 2649 Balance -551		Time (weeks)	Weight (kg)	Today	0	95	Next check	8	91	Goal	20	85
	Time (weeks)	Weight (kg)											
Today	0	95											
Next check	8	91											
Goal	20	85											

Cardiorespiratory Fitness (Fitmate Pro/Med only)

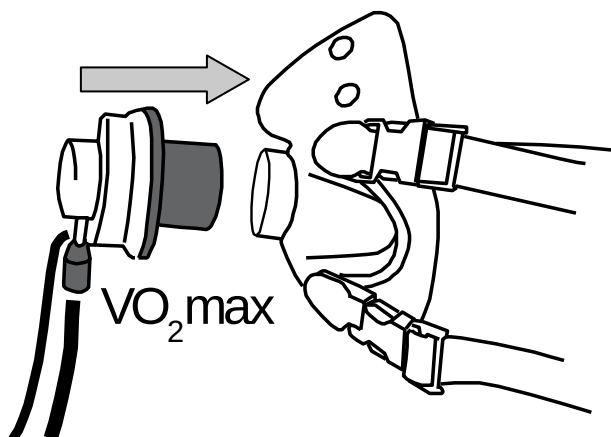
Select **Cardio Respiratory Fitness** from the test menu.

User may choose between the VO₂max or field tests

► Setting-up of a Cardio-Respiratory fitness test

Fitmate Preparation

Connect the VO₂max mask to the VO₂max reader, as illustrated by the picture below.

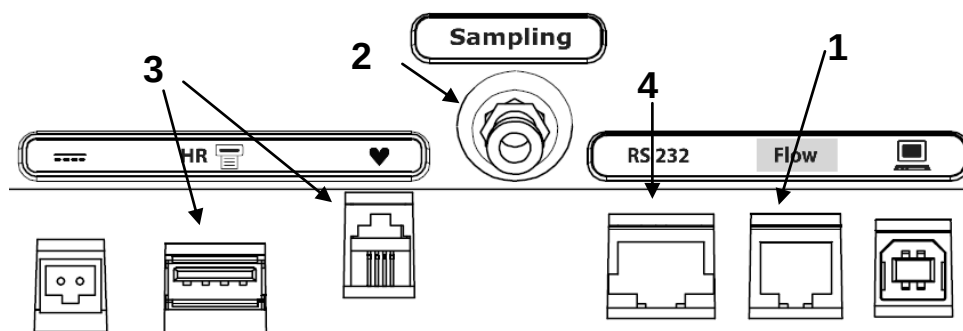


Connect the reader cable to the input labelled “*Turb*” located on the rear panel of Fitmate (1).

Connect the sampling tube to the socket labelled *Sampling* located on the rear panel of the Fitmate (2).

If HR is being monitored, attach the HR belt to the subject and connect the HR probe to the proper socket located in the rear panel of the Fitmate (3).

The Fitmate also has the ability to control an ergometer through a serial connection. Connect the ergometer cable to the RS232 port located in the rear panel of the unit (4) and to the PC cable of the ergometer (it should be supplied with the ergometer). Before starting the test, select the proper ergometer (see after, *Initialization of the unit*).

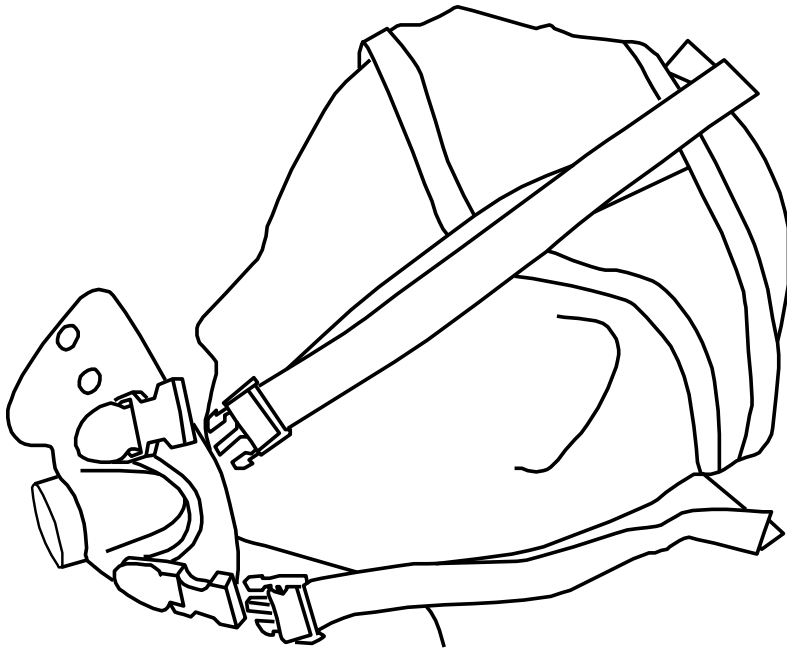


Subject preparation

Make sure that the subject is in a good health.

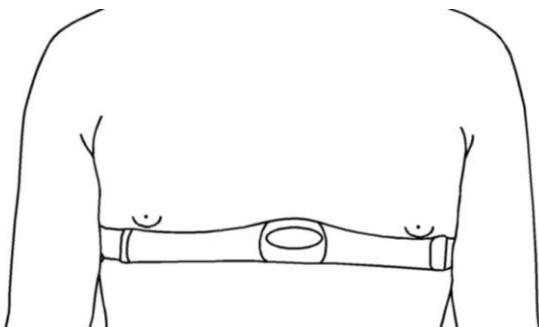
Position the subject properly on the ergometer.

Attach the mask as illustrated in the picture below, pull the velcro straps of the head cap in order to eliminate leaks. The mask must be sealed to the face of the subject.



Use the HR belt following these guidelines.

1. Attach the Transmitter to the elastic strap.
2. Adjust the strap to fit tightly and comfortably.
3. Secure the strap around the subject's chest, below the pectoral muscles and lock the buckle.



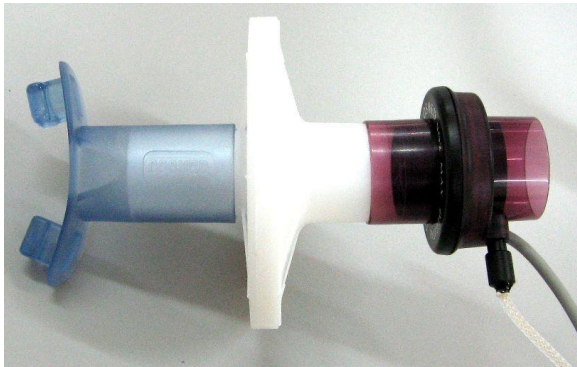
4. Without detaching the elastic strap, pull the transmitter away from the subject's body exposing the two grooved areas that are located on the underside of the transmitter. Wet the grooved electrode areas with saliva, contact lens solution or any other saline solution. Return to its original position against the subject's skin.
5. After wetting the electrodes, do not slide the transmitter around on your body as this can dry out the electrodes.

It is recommended to wear the transmitter against bare skin to ensure proper operation. If the transmitter is worn over a shirt, the shirt has to be saturated with water where the electrodes sit to ensure proper conductivity.

In order to have good HR signal, it is suggested that the HR receiver be placed as close to the HR belt as possible. If the signal is poor search for the best position for the HR probe.

During a sub-maximal test (ventilation less than 100 l/min), it is possible to use a rubber mouthpiece and antibacterial filter along with nose clips instead of the Mask.

In this case, assemble mouthpiece, filter and reader as illustrated in the following picture. Make sure that no leaks occur between mouth and mouthpiece.



► Performing a VO₂max test

Note: Mobile phones should be turned off prior to testing to eliminate potential interference.

Initialization of the unit

Select **1.Cardiorespiratory fitness: VO₂max** to start the test. The interface will be different depending on the device used (Fitmate Pro or Fitmate Med)

✕ Cancel OK Confirm		✕ Cancel OK Confirm	
Test type	Maximal	Test type	Maximal
Ergometer	Other-not interfaced	Ergometer	Other-not interfaced
Exercise protocol	None	Exercise protocol	None
End of test HR (%HRmax)		End of test HR (%HRmax)	
HRmax (bpm)		HRmax (bpm)	
Speed UM	Kmh	Speed UM	Kmh
Load UM	Watt	Load UM	Watt
Choose test type		FEV1 (l)	
		5.27	
		Choose test type	

Fitmate Pro

Fitmate Med

Select the desired entry using the navigator tool:

- Type of test (maximal, sub-maximal, energy expenditure). For the test of energy expenditure refer to the specific paragraph.
- The ergometer used (if any, and if user wants to control it by the Fitmate)
- Exercise protocol (Bruce, Ramp, etc)
- If a sub-maximal protocol has been selected, the reasons for stopping the test (% of the maximal physiological HR, etc.) must be set as well. It is recommended not to exceed the 85% of maximal HR.
- The maximum heart rate (only for sub-maximal tests). This value is automatically calculated as 220-age, but it can be modified by the user if necessary, in order to achieve a better extrapolation of the results. For example, highly trained athlete may have a higher maximum heart rate, while a subject who takes blood pressure medication may have a lower maximum heart rate.

Warning: Do not modify the maximum heart rate if you are not 100% sure of the subject's actual maximal heart rate. Modifying this value without being absolutely sure of it can lead to serious consequences and cause dangerous situations.

Warning: If medications for BP/HR are prescribed, reduce HRmax by a minimum of 20 bpm.

- The measurement unit for speed (miles/hour or km/hour) and work (Watt or kg*m/min)
- The FEV1 value (Fitmate Med only) is preset to the measured value (if present in the current session) or to the predicted value.

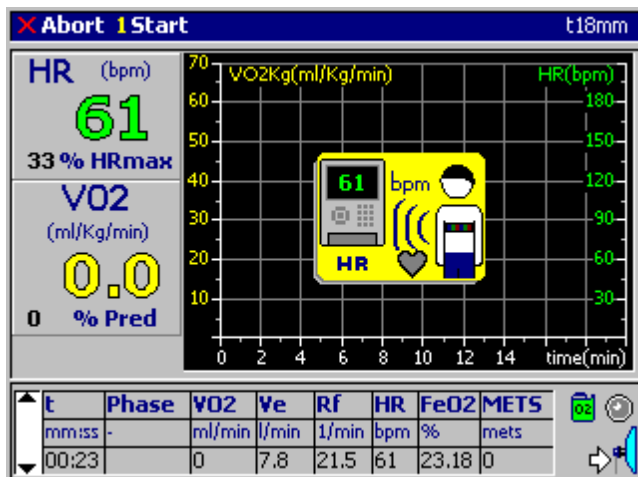
Warning: Maximal exercise testing for the assessment of the cardio respiratory fitness can be performed only in presence of licensed medical staff and under the supervision of a physician. Sub-maximal exercise tests are only allowed in absence of medical staff.

Warning: The maximal exercise test does not end automatically. For this reason, it is necessary to have supervision of a physician.

Press **OK** to confirm. An automatic O₂ analyzer calibration precedes the beginning of the test.

Starting the test

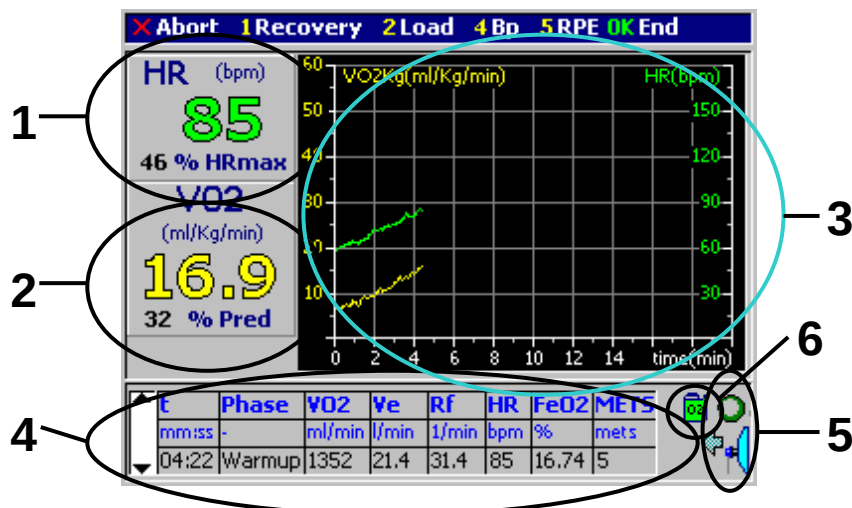
Once the calibration has completed, the test starts automatically. During the first phase of the test, no data is stored. The purpose of this phase is to check whether the equipment is working properly, to verify the detection of HR and to get the subject familiar with the equipment.



When it is determined that everything is working properly, press **1.Start** to start the test.

Note: The test will start automatically after one minute if start is not pressed.

Test Execution



During the test various parameters are displayed in real time:

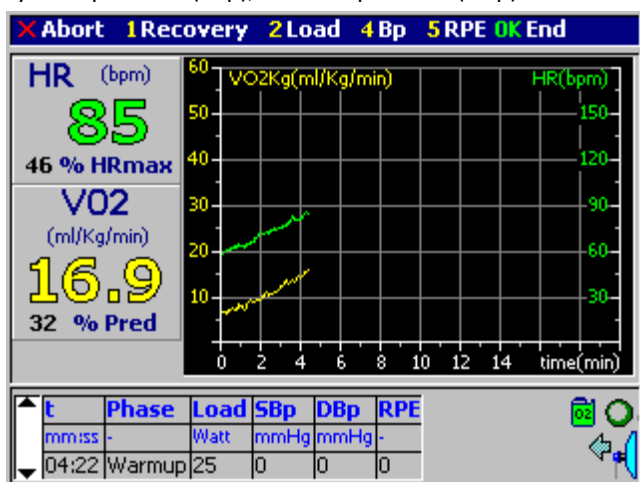
- In the top left corner of the screen (1), HR is monitored also as percentage of the age predicted maximal heart rate.
- Below the bar (2), the numeric value of VO₂/Kg and its percentage of predicted.
- The graphs to the right (3), VO₂/Kg and HR are plotted against time
- At the bottom of the screen, a table (4) including: elapsed time (t), Phase, Ventilation (Ve), Oxygen consumption (VO₂), Respiratory frequency (Rf), heart rate (HR), fraction of O₂ expired (FeO₂) and METS.
- In the bottom right corner of the screen:
 - (5) an icon which will become green during the O₂ sensor calibration and change to a small face mask with arrows indicating the inspiration and expiration phases of each breath. The icon becomes red when HR>90% of the HR selected as max HR, this indicates that auto-calibration has been disabled in order to avoid data loss.

(6) an icon which shows the O₂ sensor status during the last calibration (including the ones automatically performed during the test)

By selecting **3.Options**, user can configure:

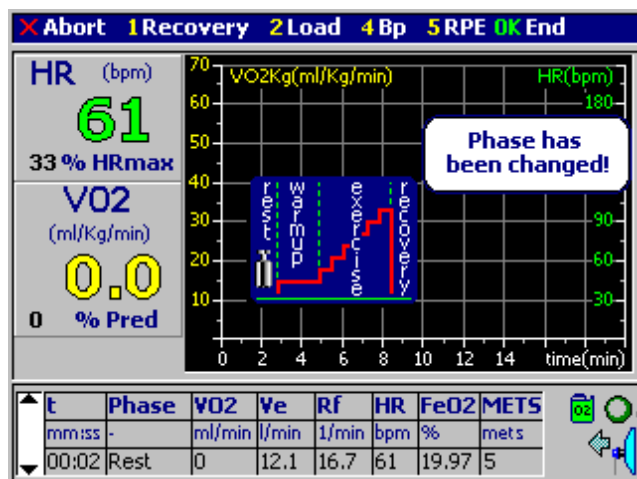
- The interval time between steps (15 seconds by default)
- The interval time between automatic calibrations (6 minutes by default)
- The interval time for averaging data (30 seconds by default)
- Whether or not all data is to be printed at the end of the test
- Whether or not the training zones are to be printed (see, Options)
- If the HR is activated (in this case, a warning message will appear if the heart rate is not detected)

Other parameters can be displayed in the real time table by using the up and down arrows on the navigator tool: load, systolic pressure (SBp), diastolic pressure (DBp) and of rate of perceived exertion according to the Borg-scale (RPE):



The values for SBp and DBp can be measured by an external monitor and manually entered by pressing **4.Bp**, the rate of perceived exertion can be determined and then entered by pressing **5.RPE** (according one of the following scales):

Category scale (original)		Category Scale (Borg)	
6		0	Nothing at all → No intensity
7	Very, very light	0.3	
8		0.5	Extremely weak → Just noticeable
9	Very light	0.7	
10		1	Very weak
11	Fairly light	1.5	
12		2	Weak → Light
13	Somewhat hard	2.5	
14		3	Moderate
15	Hard	4	
16		5	Strong → Heavy
17	Very hard	6	
18		7	Very strong
19	Very, very hard	8	
20		9	
		10	Extremely strong → Strongest intensity
		11	
		●	Absolute maximum → Highest possible



It is also possible to manually adjust the load, by pressing **2.Load**, or starting the recovery phase, stopping the selected protocol pressing **1.Recovery**.

Warning: Stop the test if any of the symptoms described in the guidelines appears

If not activated before, the recovery phase will start when indicated by the selected exercise protocol.

Canceling the test

To cancel the test press **X**.

Warning: All the data will be lost.

To end a test

To end a test press **OK**.

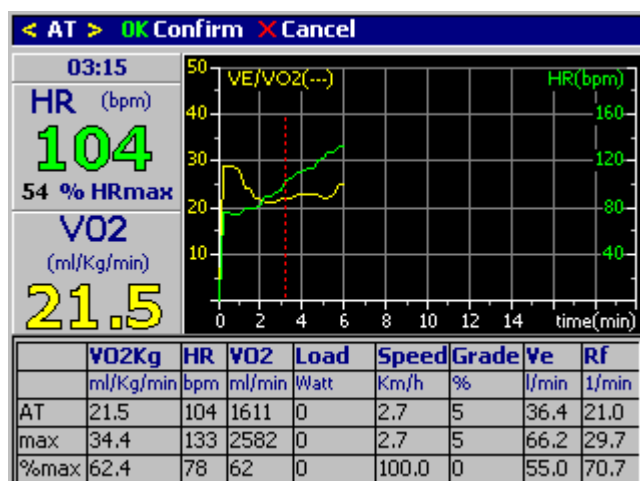
The sub-maximal test will end automatically after achieving the HR capacity determined before starting the test.

How to calculate the anaerobic threshold

At the end of a maximal test, a window asks the user if he/she wants to calculate the anaerobic threshold.

Press **OK** to calculate it, **X** to cancel.

During anaerobic threshold calculation, a window will be displayed. Using the **left** and **right** keys, it is possible to move the anaerobic threshold line. In the lower part of the screen, each parameter is displayed with its value at the AT, the maximum reached value and the % of the maximum value.



Press **OK** to confirm. A new window will automatically open up showing the test results.

X Exit 1 Test 2 Print 3 Print all	
TEST M. 25/06/2008-25/06/2008	
VO2MAX	Cardio Respiratory Fitness Date (dd-mm-yyyy) 25/06/2008 Test type Maximal Ergometer Treadmill-not interfaced Exercise protocol Modified Bruce Test length (mm:ss) 06:45 Functional Capacity (METS): 12 AT (ml/Kg/min) 21.5 AT/VO2Max (%) 49 VO2 (ml/Kg/min) 43.6 124 % Pred

► Printout interpretation

Three kinds of reports can be printed with Fitmate, depending on the device type (Fitmate Pro or Med) and its configuration (Healthy Subject or Clinical).

The reports are presented according to the following table, which summarizes their features.

		Fitmate MED		Fitmate PRO
		Healthy Subject	Clinical	
Submaximal		No AT detection		
	Printout report	Standard	Standard	Standard
	Graphs	VO ₂ Kg vs. HR	VO ₂ Kg vs. HR	VO ₂ Kg vs. HR
	Training zones	Fitness	Rehabilitation	Fitness / Elite
	Results interpretation	Fitness	Rehabilitation	Fitness
Maximal		AT detection enabled		
	Printout report	Standard	Clinical	Standard
	Graphs	VO ₂ Kg & HR vs time	VO ₂ Kg & HR vs time VE & VO ₂ /HR vs time	VO ₂ Kg & HR vs time
	Training zones	w/ AT	Fitness, AT based	Rehabilitation
		w/o AT	Fitness	Rehabilitation
	Results interpretation	Fitness	Rehabilitation	Fitness

To obtain the clinical report, it is necessary to perform a maximal test with clinical configuration on the Fitmate Med.

AT detection is available only with maximal tests.

Training zones based on measured AT are available only with Fitmate Pro or Fitmate Med in the Healthy Subject configuration.

Legend:

- Printout report:

Standard: the standard printout report

Clinical: a printout report with all cardiovascular and pulmonary data.

- Graphs:

VO₂Kg vs. HR: used in sub-maximal tests, a line shows data extrapolation to the predicted or user-defined HR max.

VO₂Kg & HR vs. time: shows the oxygen consumption and the HR vs. time. If the AT was detected/calculated, a vertical line indicates this value. If the report is a clinical one, a horizontal line indicates the predicted VO₂max.

VE & VO₂/HR vs. time: used only in the clinical report, shows the ventilation and VO₂/HR values vs. time. On the graph it a training zone is displayed indicating the MVV value and the ventilatory limitation threshold (calculated on spirometry data, if present, or on predicted values).

- Training zones:

Fitness: Labelled "Fat burning", "Endurance", "Threshold" and "VO₂Max". Customisable by the user.

Fitness, AT based: See *Fitness*., Limits are calculated from the measured AT.

Elite: Labelled "Fat burning", "Endurance", "Threshold", "Race Pace", "VO₂Max" and "Supramax". Customisable by the user.

Elite, AT based: See *Elite*., Limits are calculated from the measured AT.

Rehabilitation: Labelled "Very light", "Light", "Moderate" and "Heavy". Calculated starting from the VO₂Reserve.

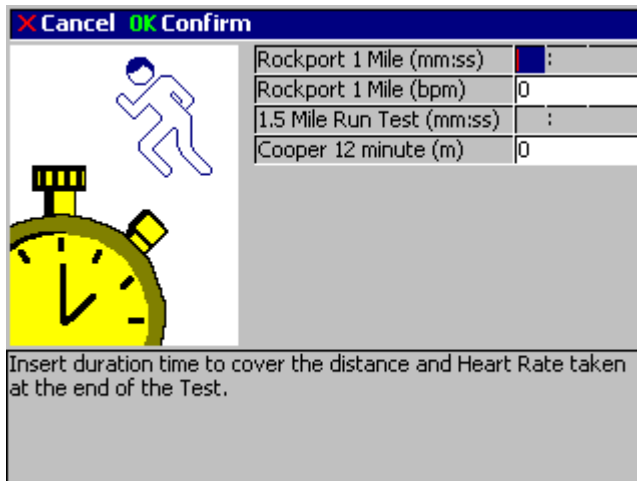
- Interpretation Results:

Fitness: Results are compared with ACSM standard

Rehabilitation: Results are compared with AHA recommendations.

► Performing a “field test”

Press **2**.Cardiorespiratory fitness: Field Test to start this test.



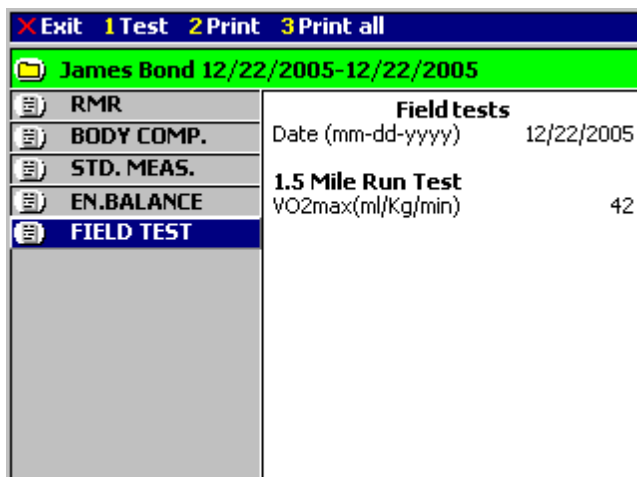
Cancel Confirm	
Rockport 1 Mile (mm:ss)	:
Rockport 1 Mile (bpm)	0
1.5 Mile Run Test (mm:ss)	:
Cooper 12 minute (m)	0

Insert duration time to cover the distance and Heart Rate taken at the end of the Test.

The results of one of the following tests can be entered in the respective field:

- Rockport Walking Test
- 1.5 mile run
- Cooper test

Press **OK** to confirm. The manually entered results will appear on the screen.



Exit 1Test 2Print 3Print all	
James Bond 12/22/2005-12/22/2005	
RMR	
BODY COMP.	
STD. MEAS.	
EN.BALANCE	
FIELD TEST	
Field tests	
Date (mm-dd-yyyy)	12/22/2005
1.5 Mile Run Test	
VO2max(ml/Kg/min)	42

Muscular Fitness (Fitmate Pro only)

► Test execution and data entry

Select **Muscular Fitness** from the test menu to start the test.

Execute the test as illustrated by the picture on the left side of the screen and described at the bottom of the screen. Then enter the results in the respective fields.

If a zero is entered in a field, this value won't be showed neither in the test results nor in the printout.

X Cancel OK Confirm	
	Muscular Endurance
	Push-up(rep) 16
	Curl-up(rep) 32
	Sit-up(rep) 20
	Muscular Power
	Lower Body: Reps (1RM, or est.) 1
	Lower Body: Lifted Weight(Kg) 155
	Upper Body: Reps (1RM, or est.) 1
	Upper Body: Lifted Weight(Kg) 85
	The maximal number of push-ups performed consecutively without rest is counted as the score. Rest is allowed in the up position only. Not suitable for subjects at risk, obese or elder!

For the *Muscular power* section, measurements can be performed in two different ways:

1. With a single repetition (maximal measurement), by entering 1 in the Reps field and the maximum weight lifted in the field Lifted Weight
2. With maximum 9 repetitions (sub-maximal measurement), entering the number of repetitions in the Reps field and the weight lifted in the field Lifted Weight. The weight lifted must be the one that the subject cannot perform another repetition.

Press **X** to cancel or **OK** to confirm, the report of the measurements will appear on the screen.

X Exit 1 Test 2 Print 3 Print all	
James Bond 12/22/2005-12/23/2005	
RMR	Muscular Fitness
BODY COMP.	Date (mm-dd-yyyy) 12/23/2005
STD. MEAS.	Push-up(rep) 16
EN.BALANCE	Curl-up(rep) 32
FIELD TEST	Sit-up(rep) 20
MUSC. FIT.	Lower Body: Lifted Weight(Kg) 155
	Lower Body: Reps (1RM, or est.) 1
	1-RM(Kg) 155
	Upper Body: Lifted Weight(Kg) 85
	Upper Body: Reps (1RM, or est.) 1
	1-RM(Kg) 85

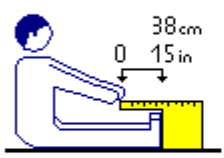
Evaluation of flexibility (Fitmate Pro only)

► Test execution and data entry

Select **Flexibility** from the test menu to start the test

Execute the test as illustrated by the picture on the left side of the screen and described at the bottom of the screen. Then enter the results in the respective fields.

✕Cancel OK Confirm



Flexibility (cm)

The subject seats placing the soles flat against the seat and reach box. The score is the most distal point reached in three trials with the fingertips keeping the hands one over the other one. Exhalation and head between the arms are recommended when reaching.

Press **X** to cancel or **OK** to confirm, the report will appear on the screen.

✕Exit 1Test 2Print 3Print all

James Bond 12/22/2005-12/23/2005

RMR	Flexibility	
BODY COMP.	Date (mm-dd-yyyy)	12/23/2005
STD. MEAS.	Flexibility(cm)	15
EN.BALANCE		
FIELD TEST		
MUSC. FIT.		
FLEXIB.		

Energy expenditure during exercise (Fitmate Pro only)

► Set-up

Refer to the cardiorespiratory Fitness (Fitmate Pro/Med only).

► Perform a test

Note: Mobile phones should be turned off prior to testing to eliminate potential interference.

Initialization of the unit

Select **Activity Caloric Cost** to start the test.

X Cancel OK Confirm	
Test type	Caloric cost
Ergometer	Other-not interfaced
Exercise protocol	None
End of test HR (%HRmax)	
HRmax (bpm)	
Speed UM	Kmh
Load UM	Watt
Choose test type	

The test type is preset as *Caloric cost*

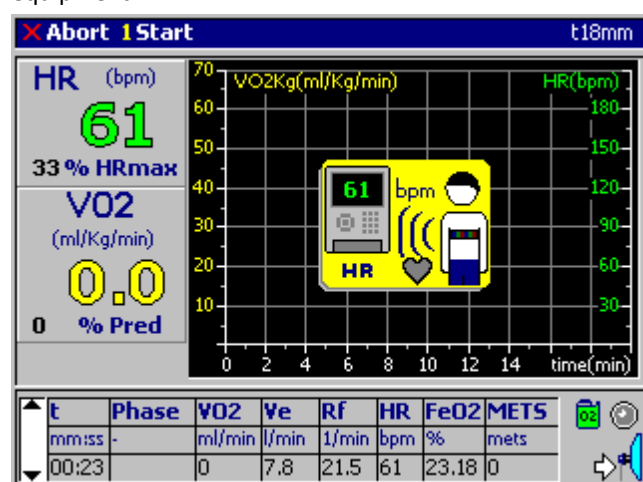
Select the desired entry with the navigator tool:

- The ergometer used for the test (if any)
- The exercise protocol
- The units for speed (miles/hour or km/hour) and work (Watt or kg*m/min)

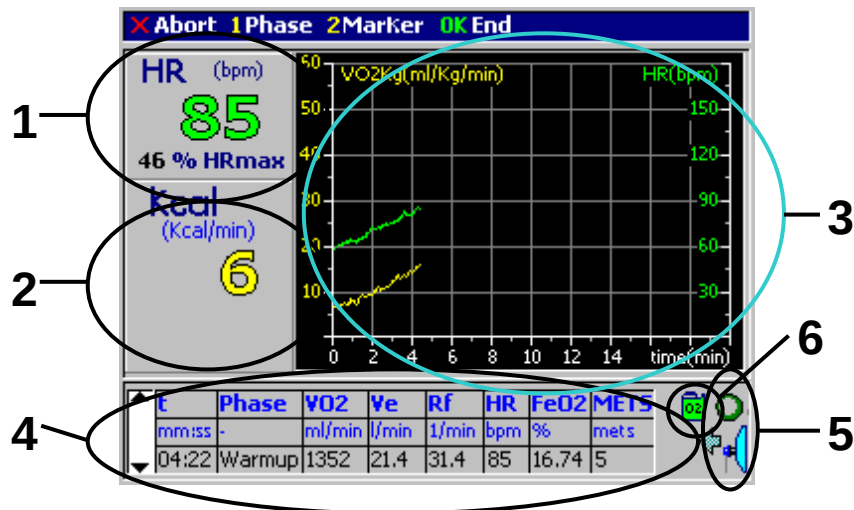
Press **OK** to confirm. An O₂ analyzer calibration precedes the start of the test.

Start of the test

Once the calibration has ended, test will start automatically. During the first phase no data is stored. Use this phase to check whether the equipment is working properly, to verify the detection of HR and to get the subject familiar with the equipment.



When everything is working properly press **1.Start** to start the test. The test will start automatically after one minute if start is not pressed.



During the test various parameters are displayed in real time:

- In the top left corner of the screen (1), HR is monitored also as percentage of the age predicted maximal heart rate.
- Below the bar (2), the numeric value of VO_2/Kg and its percentage of predicted.
- The graphs to the right (3), VO_2/Kg and HR are plotted against time
- At the bottom of the screen, a table (4) including: elapsed time (t), Phase, Ventilation (Ve), Oxygen consumption (VO_2), Respiratory frequency (Rf), heart rate (HR), fraction of O_2 expired (FeO_2) and METS.
- In the bottom right corner of the screen:

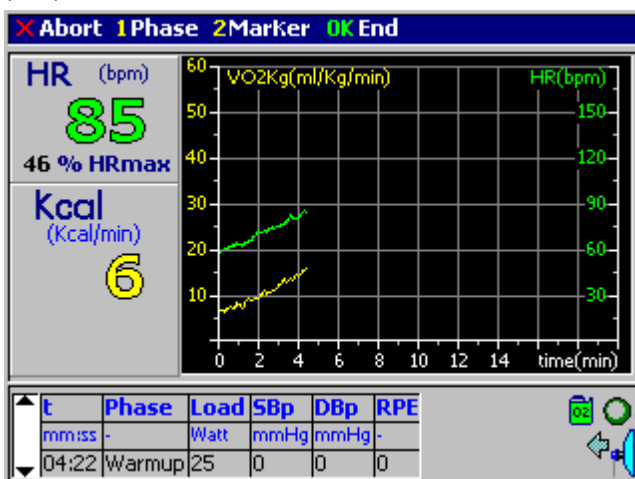
(5) an icon which will become green during the O_2 sensor calibration and change to a small face mask with arrows indicating the inspiration and expiration phases of each breath. The icon becomes red when $\text{HR} > 90\%$ of the HR selected as max HR, this indicates that auto-calibration has been disabled in order to avoid data loss.

(6) an icon which shows the O_2 sensor status during the last calibration (including the ones automatically performed during the test)

By selecting **3.Options**, user can configure:

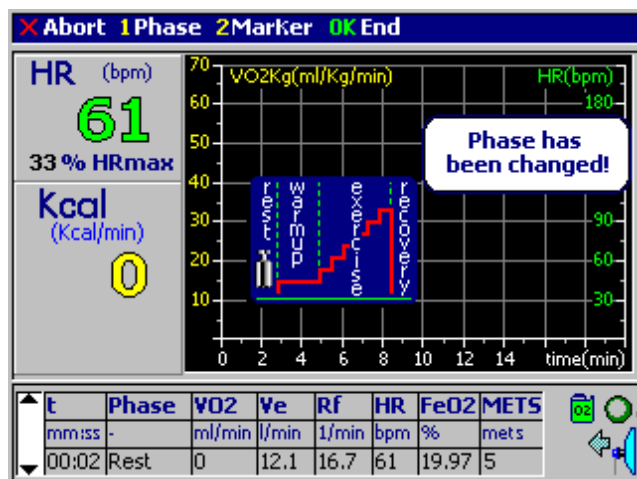
- The interval time between steps (15 seconds by default)
- The interval time between automatic calibrations (6 minutes by default)
- The interval time for averaging data (15 seconds by default)
- Whether or not all data is to be printed at the end of the test
- Whether or not the training zones are to be printed (see Options)
- If the HR is activated (in this case, a warning message will appear if the heart rate is not detected)

Other parameters which can be displayed in the real time table by pressing the up and down arrows on the navigator tool: load, systolic pressure (SBp), diastolic pressure (DBp) and of rate of perceived exertion according to the Borg-scale (RPE):



By pressing **2.Marker** it is possible to mark a particular event, such as change of exercise phase or symptom.

It is possible to manually change the exercise phase pressing **1.Phase** and then **1.Recovery**, **2.Warm up** or **3.Exercise**. Every change in phase is marked by an audible and graphical signal.



Warning: Stop the test if any of the symptoms described in the guidelines appears

If not activated before, the recovery phase will start when indicated by the selected exercise protocol.

Cancel the test

To cancel the test by pressing **X**. All the data will be lost.

To end a test

To end a test press **OK**.

The test ends automatically when reaching the HR capacity set before starting the test.

At the end of the test a window with all the results will appear.

X Exit 1 Test 2 Print 3 Print all	
James Bond 12/22/2005-12/23/2005	
RMR	Caloric cost
BODY COMP.	Date (mm-dd-yyyy) 12/23/2005
STD. MEAS.	Expenditure (Kcal) 120
EN.BALANCE	
FIELD TEST	
MUSC. FIT.	
FLEXIB.	
CALORIC COST	

► Printout interpretation

Below the header and the subject's data, each row of the *Caloric cost* data is reported as a summary of each test phase. The Fitmate considers a test phase a whole phase (rest, warm up, exercise, recovery) or a part, if a marker is entered during the phase.

The columns for each phase indicate the phase duration, energy expenditure in METS, oxygen consumption, ventilation, mean oxygen concentration in the exhaled air, maximum and the average heart rate and if a marker was entered.

Below the data is reported the energy expenditure in kcal for the entire test.

Spirometry test (Fitmate Med only)

► Contraindications for the performing spirometry

Absolute contraindications

For FVC, VC and MVV tests:

- Post-operative thoracic surgery patients.

For FVC tests:

- Severe airway instability (patients with severe Emphysema).
- Non-specific bronchial hypersensitivity.
- Severe gas exchange impairment (total or partial respiratory insufficiency).

Relative contraindications

For FVC tests:

- Spontaneous post-pneumothorax.
- Arterial-venous aneurysm.
- Severe arterial hypertension.
- Pregnant with complications in the 3rd month.

For MVV tests:

- Hyperventilation syndrome.

► Contraindications for Bronchial Provocation testing

Bronchial Provocation testing must be executed according to physician orders. Testing is considered safe when executed properly in a clinical setting, but the following contraindications should be acknowledged prior to testing:

Absolute contraindications

- Severe bronchial obstruction (decreased FEV1 in adults).
- Recent myocardial infarction.
- Recent cerebral vascular accident.
- Known arterial aneurysm.
- Inability to understand the test procedures and risks.

Relative contraindications

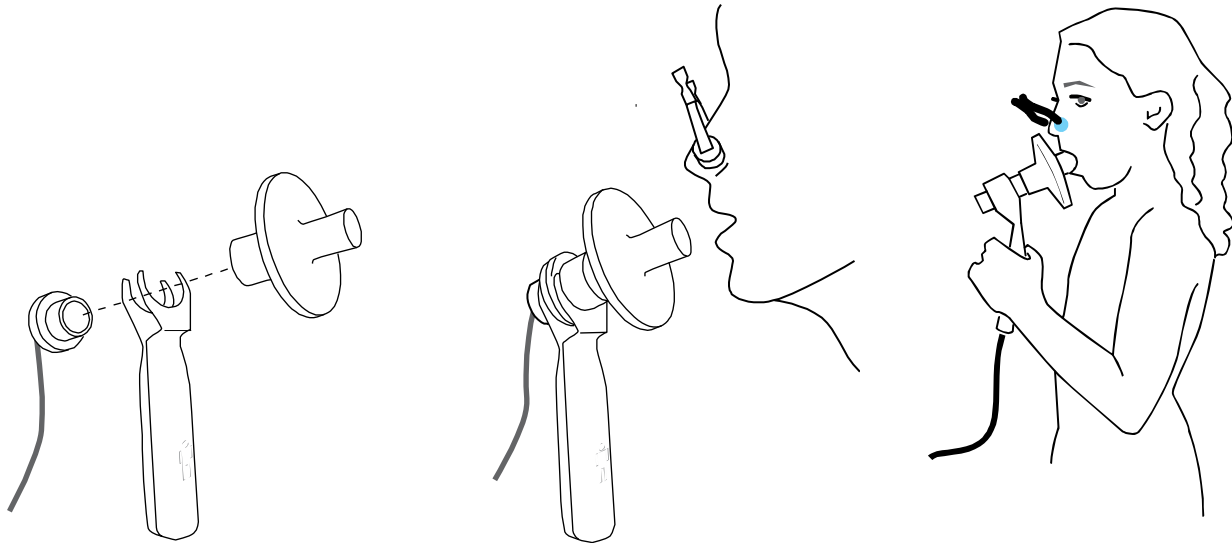
- Bronchial obstruction caused by performing respiratory manoeuvres.
- Moderate to severe bronchial obstruction ($FEV1 < 1.51$ in men and $FEV1 < 1.21$ in women).
- Recent respiratory infection.
- Recent Asthma exacerbation.
- Hypertension.
- Pregnancy.
- Epilepsy.

► General warnings

1. FVC, VC and MVV tests should be performed with the VO_2 max flowmeter attached to the handle.
2. The sampling line should be disconnected from the flowmeter.
3. Either a paper mouthpiece or an antibacterial filter should be connected to the flowmeter prior to executing the tests.

Note: Mobile phones should be turned off prior to testing to eliminate potential interference.

► Patient preparation



Disconnect the sampling line from the flowmeter and attach flowmeter to the included handle.

Instruct the patient to apply the nose clips.

Calibrate the turbine as indicated in the chapter *Calibration* (ATS recommends a daily calibration).

The use of an antibacterial filter is highly recommended.

► Forced Vital Capacity (pre)

FVC testing is used to verify obstructive and restrictive lung disorders. Automatic quality control messages are designed to ensure acceptable manoeuvres are performed for accurate interpretation.

Parameters measured during FVC tests include the following:

Symbol	UM	Parameter
FVC	l	Forced Expiratory Vital Capacity
FEV1	l	Forced Expiratory Volume in 1 sec
FEV1/FVC%	%	FEV1 as a percentage of FVC
PEF	l/sec	Peak Expiratory Flow
FEV0.5	l	Forced Expiratory Volume in 0.5 sec
FEV6	l	Forced Expiratory Volume in 6 sec
FEV1/FEV6	%	FEV1 as a percentage of FEV6
FEV6/FVC%	%	FEV6 as a percentage of FVC
Best FVC	l	Best Forced Expiratory Vital Capacity
Best FEV1	l	Best Forced Expiratory Volume in 1 sec
Best PEF	l/sec	Best Peak Expiratory Flow
Vmax25%	l/sec	Expiratory Flow when 75% of the FVC remains to be exhaled
Vmax50%	l/sec	Expiratory Flow when 50% of the FVC remains to be exhaled
Vmax75%	l/sec	Expiratory Flow when 25% of the FVC remains to be exhaled
FEF25-75%	l/sec	Mid-exp flow between 25-75%FVC
FET100%	sec	Forced expiratory time
FEV2	l	Forced Expiratory Volume in 2 sec
FEV3	l	Forced Expiratory Volume in 3 sec
FEV2/FVC%	%	FEV2 as a percentage of FVC
FEV3/FVC%	%	FEV3 as a percentage of FVC
FEV1/VC%	%	Tiffenau index
FEF50-75%	l/sec	Mid-exp flow between 50-75%FVC
FEF75-85%	l/sec	Mid-exp flow between 75-85%FVC

FEF0.2-1.2%	l/sec	Mid-exp flow between 0.2 l - 1.2 l
FiVC	L	Inspiratory Forced Vital Capacity
FiF25-75%	l/sec	Forced mid-inspiratory flow
FiV1	l/sec	Forced Inspiratory Volume in 1 sec
PIF	l/sec	Peak Inspiratory Flow
VEXT	ml	Extrapolated Volume (back extrapolation)
PEFT	msec	Time to PEF (10% - 90%)

Note: Some parameters are only calculated by the PC software.

Performing the test

1. Explain the manoeuvre to the patient (breathe at rest for several breaths, perform a maximal inhalation and then a maximal forced exhalation).
2. Select the patient, enter in the test menu, select **Spirometry & SpO2** and then **FVC**.
3. Wait until the program is ready for the test.
4. After having performed the test, press **2.End** or wait for the automatic test termination (5 seconds without flow).
5. Press **0.Exit** to abort a test and discard the results. Press **1.Start** to restart the test.
6. Press OK to confirm or X to cancel.
7. Repeat the test until it is correctly performed (ATS recommends a minimum of 3 times), by pressing **1.Start**.
8. The three best trials will be superimposed on one another, identified by different colours. On the right side of the display, the three best trials, their colours and the measured parameters are reported, ordered from the best to the worst.
9. Press **2.Save & Exit** in order to save and exit a test. You will be asked to select the test to store: press the number corresponding to the test which you would like to be stored.
10. Otherwise, press **0.Exit without saving** in order to exit the test mode without saving any of the trials.

► Slow Vital Capacity

The Slow Vital Capacity measurement is an important tool in the assessment of COPD (Chronic Obstructive Pulmonary Disease).

Parameters obtained during SVC tests include the following:

Symbol	UM	Parameter
EVC	l	Expiratory Vital Capacity
IVC	l	Inspiratory Vital Capacity
ERV	l	Expiratory Reserve Volume
IRV	l	Inspiratory Reserve Volume
IC	l	Inspiratory Capacity
VE	l/min	Expiratory Minute Ventilation
Vt	l	Tidal Volume
Rf	1/min	Respiratory Frequency
Ti	sec	Duration of Inspiration
Te	sec	Duration of Expiration
Ttot	sec	Duration of Total breathing cycle
Ti/Ttot	---	Ti/Ttot ratio
Vt/ti	l/sec	Vt/ti ratio

Note: Some parameters are calculated only by the PC software.

Performing the test

1. Explain the manoeuvre to the patient (breathe at rest, when instructed, perform a maximal inspiration, then a slow forced exhalation, and finally a deep inspiration).
2. Select the patient, enter the test menu, select **Spirometry & SpO2** and then **SVC**.
3. Wait until the program is ready for the test.

4. After having performed the test, press **2.End** or wait for the automatic termination (5 seconds without flow).
5. Press **0.Exit** to abort the test and discard the results. Press **1.Start** to restart the test.
6. Repeat the test until it is correctly performed (ATS recommends a minimum of 3 times), by pressing **1.Start**.
7. The three best tests will be superimposed on one another, identified by different colours. On the bottom of the display, the three best tests, their colours and the measured parameters are displayed, ordered from the best to the worst.
8. Press **2.Save & Exit** to exit and save a test. You will be asked to select the test to store: press the number corresponding to the trial to be stored.
9. Otherwise, press **0.Exit without saving** to exit the trial mode without saving any of the trials.

► Maximum Voluntary Ventilation

Measurement of Maximum Voluntary Ventilation is commonly performed when exercise testing is also being conducted. MVV measurements are used as an index of the subject's maximum ventilatory capacity. The procedure consists of breathing in and out as deep and fast as possible for 12 seconds. The expired volume during this 12 second period is then extrapolated to one-minute.

Measured parameters during MVV testing include the following:

Symbol	UM	Parameter
MVV	l/min	Maximum Voluntary Ventilation
MVt	l	Tidal Volume (during MVV)
MRf	1/min	Maximum Respiratory frequency
MVVt	sec	MVV duration time

Note: Some parameters are calculated only by the PC software.

Performing the test

1. Explain the manoeuvre to the patient (breathe as deep and fast as possible for about 12 seconds).
2. Select the patient, enter the test menu, select **Spirometry & SpO2** and then **MVV**.
3. Ensure the program is ready for the test.
4. After having performed the test, the device will display the V/T graph, the main parameters and the predicted values.
5. Press **0.Exit** to abort the test and discard the results. Press **1.Start** to restart the test.
6. Repeat the test until it is correctly performed (ATS recommends a minimum of 3 times), by pressing **1.Start**.
7. The three best tests will be superimposed on one another in different colors. On the bottom of the display, the three best trials, their colors and the measured parameters are reported, ordered from best to worst.
8. Press **2.Save & Exit** to exit and save the trial. You will be asked to select which trial to store: press the number corresponding to the trial to be stored.
9. Otherwise, press **0.Exit without saving** in order to exit the test mode without saving any of the trials.

► Bronchodilator test

Bronchodilators may be administered during lung function studies to determine whether or not a subject's airflow obstruction is reversible. Bronchodilators can increase airway conductivity by relaxing the smooth muscle.

This test compares the results from the initial FVC (FVC PRE) and the FVC obtained after administering the bronchodilator (FVC POST). If the FEV1 increases by 13-15% with respect to the baseline value is representative of reversible airways disease.

Performing the test

The manoeuvre is identical to the FVC test.

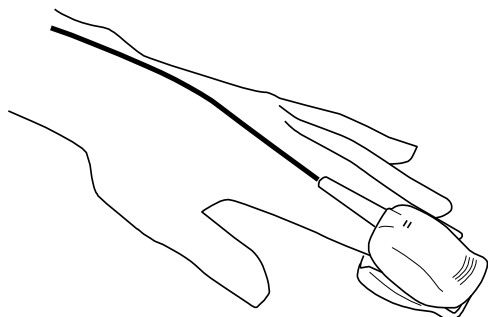
1. Select the patient, enter the test menu, select **Spirometry & SpO2** and then **FVC post BD**.
2. Wait until the program is ready to perform the test.
3. After performing the test, press **2.End** or wait for the automatic termination (5 seconds without any flow).
4. Press **0.Exit** to abort the test and discard all results. Press **1.Start** to restart the test.
5. Press **OK** to confirm or **X** to cancel.
6. Repeat the test until it is properly performed (ATS recommends a minimum of 3 times), by pressing **1.Start**.

-
7. The three best trials will be superimposed on one another, identified by different colours. On the right side of the display, the three best trials, their colours and the measured parameters are reported, ordered from best to worst.
 8. Press **2.Save & Exit** in order to exit and save a trial. You will be asked to select the individual trial which you would like to store: press the number corresponding to the trial to be stored.
 9. Otherwise, press **0.Exit without saving** in order to exit the test mode without saving any of the trials.

Oximetry test (Fitmate Med only, option)

► Patient preparation

Connect the oximeter probe to the patient's finger.



► General warnings

1. The oximeter probe should be connected to the RS232 port on the back of the Fitmate Med.
2. Ensure that the sensor is properly disinfected between patients.
3. ONLY use COSMED oximeters.
4. Measurement accuracy and operation may be affected by the following:
 - intense ambient light
 - fingernail polish or artificial fingernails
 - excessive motion

Note: Mobile phones should be turned off to eliminate potential electrical interference.

► The oximetry test

The oximetry test measures the percentage of hemoglobin saturated with oxygen in the blood. The test can be performed at rest or during/after a light exercise (cycling, jogging).

The parameters measured include the following:

Symbol	UM	Parameter
SpO ₂	%	Haemoglobin saturation
HR	bpm	Heart rate

► Performing the test

1. Connect the sensor to the unit through the RS232 port on the back of the Fitmate.
2. Connect the probe to patient's index finger and affix with adhesive tape if necessary, this will improve conductivity.
3. Select the patient, enter in the test menu, select **Spirometry & SpO2** and then **SpO2**.
4. During the initial part of the test, the HR and SpO₂ values together with a plethysmographic graph, are displayed. The graph monitors the quality of the signal.
5. Wait for an acceptable quality of the real-time signal and verify that the Perfusion indicator is green. Press:
 - 1.Rest to store the rest value.
 - 2.RestO2 to store the rest value with inspired oxygen supplement
 - 3.Exer to store the exercise value.
 - 4.ExerO2 to store the exercise value with inspired oxygen supplement.
6. It is not necessary to store all three values during a single test.

Risk analysis (Fitmate Med only)

By selecting risk analysis, it is possible to calculate the future cardiovascular disease risk based on different international standards.

Select **Risk analysis** from the test menu to start the test.

There are four (4) main test types to choose from.

► European risk

Enter the data requested and press **OK** to confirm or **X** to cancel.

European Risk

HIGH-RISK: Albania Algeria Armenia Austria Belarus Bulgaria Croatia Cyprus Czech Republic Denmark Egypt Estonia Finland Germany Georgia Hungary Iceland Ireland Israel Latvia Libanon Libya Lithuania Former Yugoslav Macedonia Moldova Morocco Norway Romania San Marino Serbia Montenegro Slovakia Netherlands Tunisia Turkey Ukraine United Kingdom

Mode: **HIGH RISK**

Gender: **Male**

Age: **38**

Total cholesterol (mmol/l):

Systolic Blood Pressure (mmHg):

Smoker: **NO**

SCORE

≥15%
10%-14%
5%-9%
3%-4%
2%
1%
<1%

10 years CVD Risk(%) **0**

Mode: Low risk for Belgium, France, Italy, Luxembourg, Spain, Switzerland and Portugal. High risk for the other Countries.

Total cholesterol: The measurement unit can be modified in **Option/Advanced**.

Systolic Blood Pressure: Already entered, if measured (in *Standard Measurements*) in the current session.

The report will appear on the screen.

European Risk

Date (dd-mm-yyyy) **30/01/2008**

Mode: **LOW RISK**

Total cholesterol (mmol/l) **3.2**

Systolic Blood Pressure (mmHg) **120**

Smoker **NO**

10 years CVD Risk(%) **0**

SCORE

≥15%
10%-14%
5%-9%
3%-4%
2%
1%
<1%

► Frammingham CHD

Enter the data required and press **OK** to confirm or **X** to cancel.

✕ Abort OK End

Frammingham CHD

 Gender  +

Age 38 +

Total cholesterol (mmol/l)  +

HDL cholesterol (mmol/l)  +

Systolic Blood Pressure (mmHg)  +

Diabetes NO  +

Smoker NO  =

Absolute Risk (%) 2

Relative Risk 1.0 



Total cholesterol: The measurement unit can be modified in **Option/Advanced**.

Systolic Blood Pressure: If you have already entered this (in *Standard Measurements*) it will automatically appear on the current screen.

The report will appear on the screen.

✕ Exit 1 Test 2 Print 3 Print all

Bond J. 30/01/2008-30/01/2008

BODY COMP.

FVC

SVC

EUROPEAN

FRAMMINGHAM

Frammingham CHD

Date (dd-mm-yyyy) 30/01/2008

Total cholesterol (mmol/l) 5.1

HDL cholesterol (mmol/l) 4.0

Systolic Blood Pressure (mmHg) 130

Diabetes NO

Smoker NO

Absolute Risk (%) 2

Relative Risk < 1.0





► Duke Treadmill Score

Enter the data requested and press **OK** to confirm or **X** to cancel.

✕ Abort OK End

Duke Treadmill Score

 ST Deviation during Exercise(mm)  +

Duration of Exercise(METS)  +

Angina during Exercise None  =

0

The report will appear on the screen.

X Exit 1 Test 2 Print 3 Print all	
Bond J. 30/01/2008-30/01/2008	
BODY COMP.	Duke Treadmill Score
FVC	Date (dd-mm-yyyy) 30/01/2008
SVC	ST Deviation during Exercise(mm): 2
EUROPEAN	Duration of Exercise(METS) 6
FRAMMINGHAM	Angina during Exercise None
DUKE TREADM	Duke Score -3

► Bode Index

Enter the data requested and press **OK** to confirm or **X** to cancel.

X Abort OK End	
BODE Index	
	BMI (Kg/m ²) 24.6 +
	FEV1 (l) 2.91 +
	Distance walked in 6 m'(m) +
	MMRC dyspnoea scale 0 +
Not troubled with breathlessness except during strenuous exercise	
Bode Index (0-10)	
Probability of 4 year survival (%)	

FEV1: This value will be input via the Fitmate if you have performed spirometry during this test session.

The report will appear on the screen.

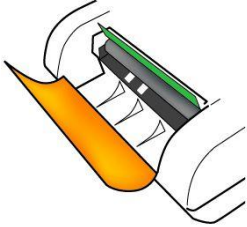
X Exit 1 Test 2 Print 3 Print all	
Bond J. 30/01/2008-30/01/2008	
BODY COMP.	BODE Index
FVC	Date (dd-mm-yyyy) 30/01/2008
SVC	FEV1 (l) 2.91
EUROPEAN	Distance walked in 6 m'(m) 1000
FRAMMINGHAM	MMRC dyspnoea scale 1
DUKE TREADM	4 year survival (%) 82
BODE INDEX	Bode Index (0-10) 1

How to load paper in the printer compartment

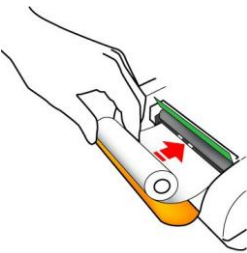
Fitmate can automatically print on rolls of thermal paper (code A-196-056-001, set of 10 rolls).

To replace this paper:

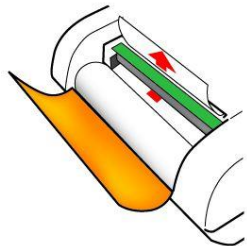
1. Open the paper compartment's orange or green cover.
2. Lift up the green lever.



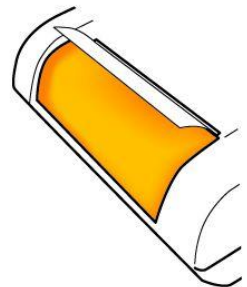
3. Put the paper roll in the paper compartment. Insert one end of the roll in the slit indicated by the 2 grey guides under the green lever.



4. Lower the green lever.
5. Select **4.Utility/5.Paper feed** from the menu. The equipment will then feed the paper. If this does not happen, double check that the paper has been installed properly.



6. Close the orange or green cover, paying attention that some of the paper is outside the Fitmate.



► Test printout

1. Choose the test to print from a test session.
2. Select **2.Print** or **3.Print all** to print out an individual test or the entire test session.

If the paper is missing, or the printer head (green lever) is raised, an acoustic signal and graphic warning warns the user and the Fitmate automatically aborts the print job. To correct this, ensure that the paper is installed correctly and that the printer head (green lever) is down.

Additional functions of Fitmate

Some functions allow the user to customize the unit and are only accessible from the menu **4.Utility**

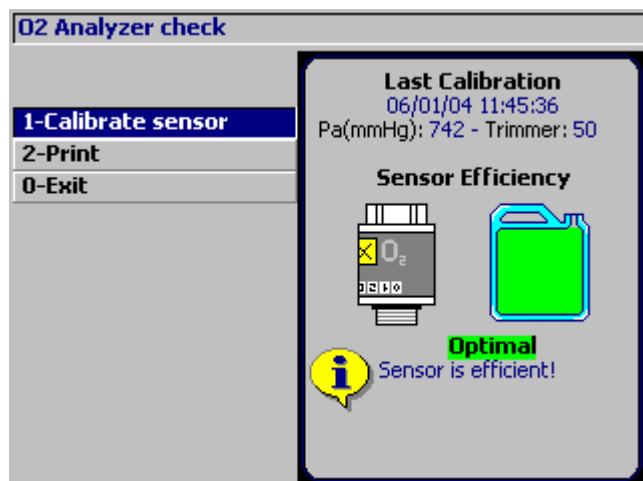
► Flowmeter calibration

This function allows the user to calibrate the flowmeter, correcting the errors caused environmental changes that may affect the turbine, repeated use, obsolescence, etc.

For the details see the related section, in the chapter *Maintenance*.

► O₂ analyzer check

This function allows the user to verify the efficiency of the O₂ analyzer and, when necessary, program the replacement.

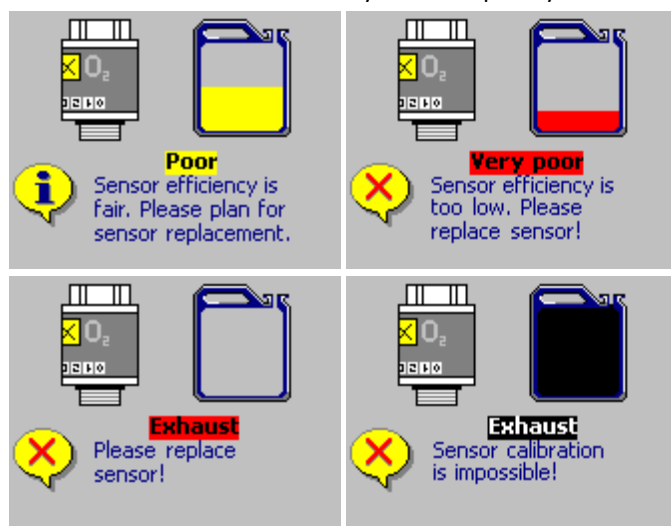


The colour of the tank and the note at the bottom of the screen indicate the analyzer's efficiency.

The colour will change depending on the analyzer status:

- Green indicates normal efficiency.
- Yellow warns the user that the analyzer will need to be replaced soon.
- Red indicates that analyzer is about to expire and should be replaced before more tests are performed.

No colour indicates that the analyzer is completely exhausted



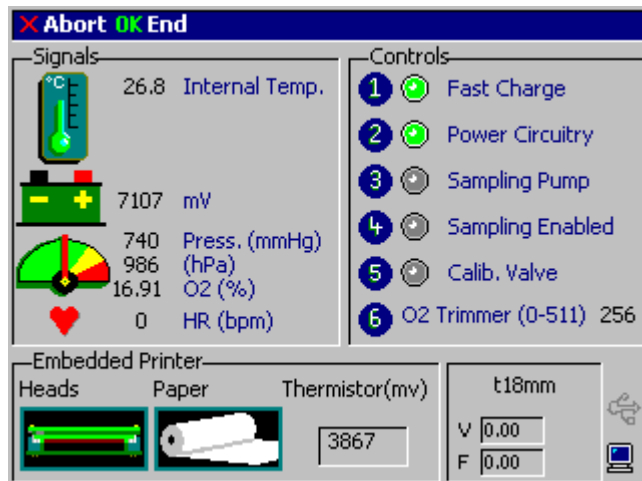
Information on date and time of the last O₂ sensor calibration and other sensor data can be seen and printed by selecting one of the options displayed on the right hand side of the screen

The sensor efficiency can also be monitored from the main menu. The tank icon is located at the lower right corner of the screen, the colour of the icon represents the same information as mentioned above.

1.Calibrate sensor starts an O₂ sensor calibration and prints automatically the calibration report at the end.

2.Print prints the calibration report.

► Control panel



The control panel allows the user to check all the electrical signals as well as other equipment functions. It is divided in 4 sections:

Signals

You will find information from built-in sensors:

The temperature sensor indicates the temperature inside the Fitmate (the operating temperature of the O₂ sensor);

The battery charge sensor detects the total charge of the battery (in mV);

The O₂ sensor detects the analyzer pressure and the O₂ readings.

The HR sensor detects the heart rate (if the probe is connected)

Controls

In this section, each component can be activated for troubleshooting.

Built-in printer

The icon *heads* indicates whether the green printer lever is opened or closed.

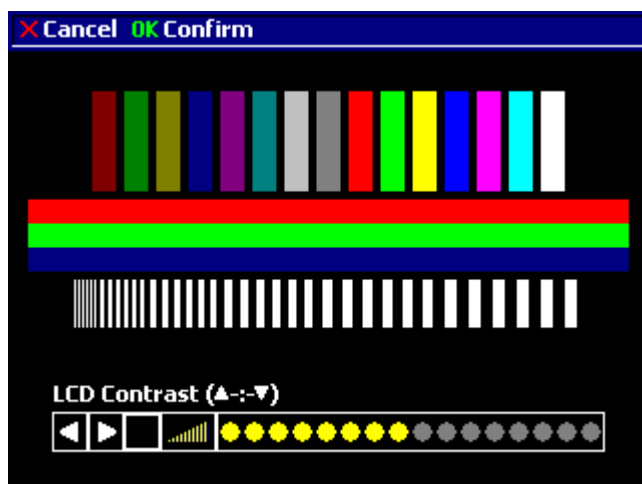
The icon *Paper* indicates whether the paper is ok or not.

The value in the field *Thermistor* indicates the temperature of the printer.

Turbine

This section shows the turbine connected to the Fitmate and the volume and measured flow values.

► LCD contrast



This utility allows you to adjust the contrast of the display.

1. Use the left and right arrows to roughly adjust the contrast.
2. Use the up and down arrows to finely adjust the contrast.
3. Press **OK** to confirm.

► Paper feed

Select this entry to feed the paper when loading a new paper roll.

► Erase memory

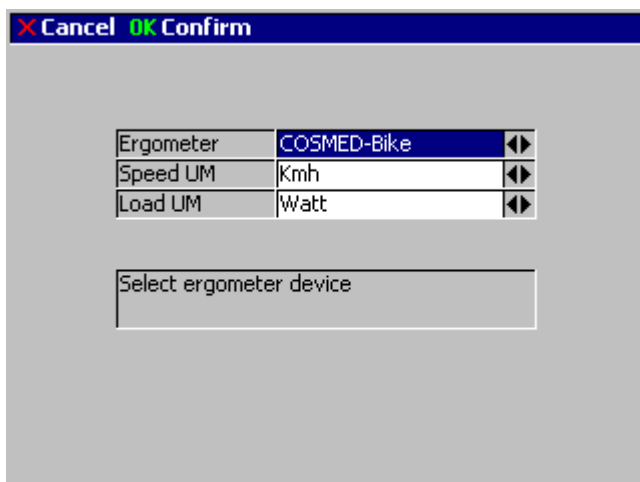


Select this entry to erase the archive. After selecting this option, a warning message will appear reminding the user to press the buttons 3, 6, 9 quickly in order to erase the archive, or press any other button to exit.

Warning: this operation will delete all the archive. Before erasing the memory, be sure to store all the relevant data on an external device (hard disk, CD-ROM, USB key,...)

► Ergomanager

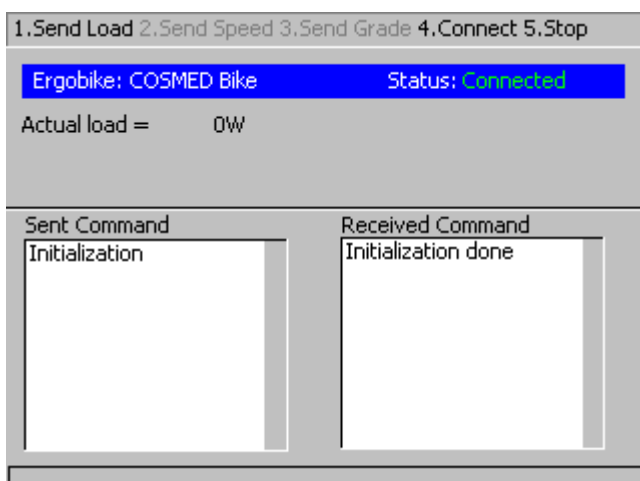
Select this entry to verify the communication protocol with an ergometer.



You can set:

- The ergometer
- The speed measurement unit
- The load measurement unit

Press **OK** to confirm.



The unit tries to connect to the ergometer. It will appear a window, the top menu allows you to:

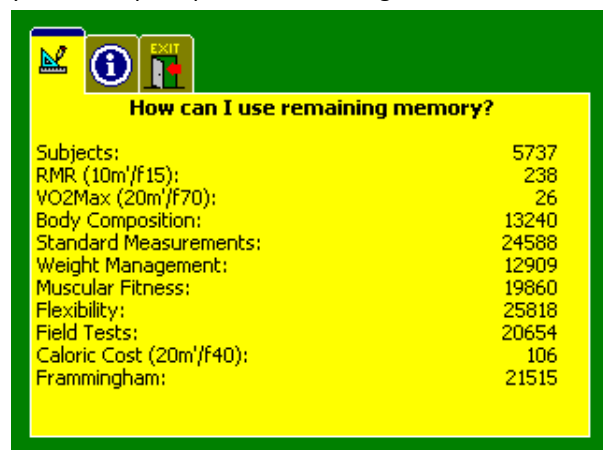
1. Send a load to the cycle ergometer (disabled if connected to a treadmill)
2. Send a speed to the treadmill (disabled if connected to a cycle ergometer)
3. Send a grade to the treadmill (disabled if connected to a cycle ergometer)
4. Connect to the ergometer (if disconnected)
5. Stop the communication.

► Information

Select this option to read the information about the Firmware version installed on the Fitmate and the amount of free, used and deleted (but not available) memory.



Pressing **1.Admin** you can access to a new menu. Only the item **1.Memory Status** is accessible. Selecting this menu item you will be prompted the following information.



Advanced operations

▶ Reset Fitmate

If Fitmate should lock up, a reset may be necessary. It can be done by pressing the small reset button located on the bottom of the Fitmate. You will need to use a pin or paperclip to press the button.

Resetting the Fitmate will not cause any loss of data, it just restarts the internal program.

▶ Format the memory

Formatting the Fitmate's memory is possible, however not recommended. It will erase all data including the software installed on the unit.

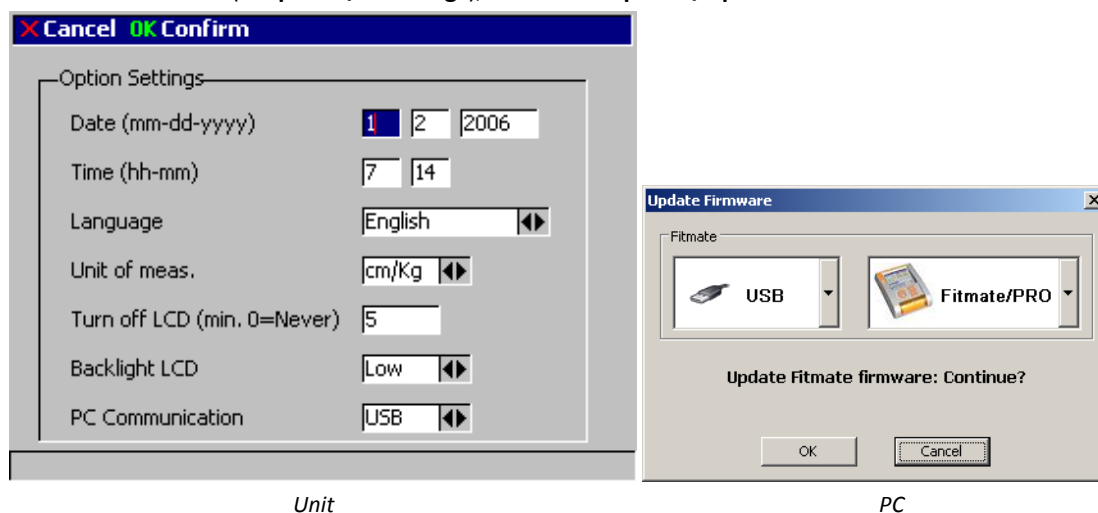
To do this turn on the Fitmate and keep the **X** button pressed after releasing the **on/off** button, then release the **X** button.

It will be necessary to re-transmit the firmware from the PC (by selecting **Options/Update firmware...**).

Warning: All the data contained in the memory will be deleted and will no longer be retrievable. Thus it is recommended to back up all data.

▶ Firmware update

To update the firmware to a new release, connect the unit to the PC, be sure that the proper communication port is selected on the unit (**3.Options/1.Settings**), and select **Options/Update firmware...** on the PC software.

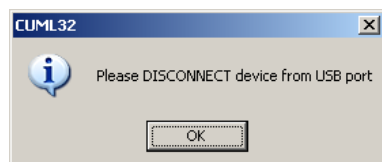


Select the communication port, the device model and press **OK** to confirm.

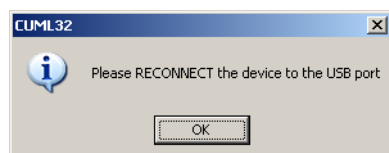
Note: if the unit displays a warning message, check that the selected device is correct and, in case, ignore the message and continue the operation.

Note: in case of downloading the wrong firmware on the unit (e.g. a Fitmate Med firmware on a Fitmate Pro unit), the device gets stuck. In this case, repeat the downloading procedure for the correct version.

At the end of the procedure, the software prompts the following dialog:



Please, disconnect the device from the PC, press **OK** and wait for the following message.



Please, connect the Fitmate to the PC and press **OK**.

Maintenance

System maintenance

Maintenance and repair procedures which are not described in this manual must be performed by qualified personnel in accordance with the service manual, which the manufacturer may supply upon request.

Prior to the cleaning, disinfection and inspection, it is necessary to switch off the device and disconnect adapters from the outlet.

In order to guarantee the highest accuracy of the data we recommend that you periodically disinfect the turbine.

Use disposable anti-bacterial filters or the RMR masks, or disinfect each part of the Fitmate which has come in contact with the subject's expired air before testing a new subject

Calibrating flows and volumes

Regular calibration is necessary to ensure your system is acquiring reliable data.

Flow/volume calibrations must be performed with a 3 liter calibration syringe.

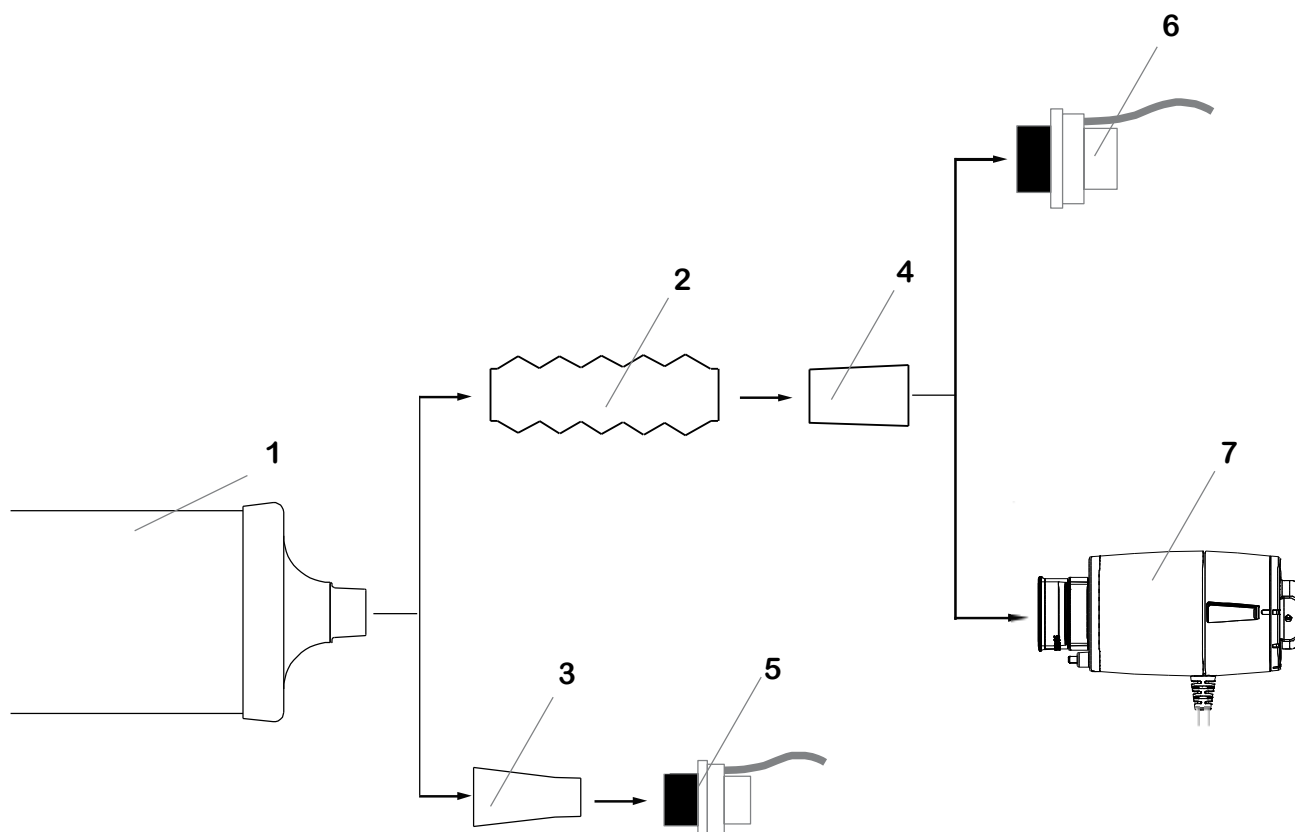
Note: If a bacterial filter is used for testing you should also include one when performing the turbine calibration.

Flow and volume are measured by the digital bidirectional turbine, which has a very low flow resistance. Air passing through the helical conveyors cause the spiral rotation of the turbine's rotor.

The rotating blades interrupt an infrared light emitted by the three diodes on the optoelectronic reader.

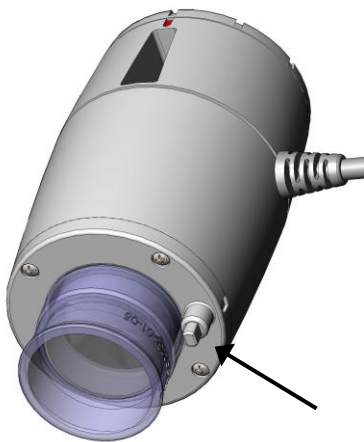
The turbine flowmeter does not require daily calibration since it is not affected by pressure, humidity and/or temperature. However, regular calibrations should still be performed as well as following recommended maintenance procedures.

1. Connect the syringe to the flowmeter of choice (18 mm or 28 mm), as shown in the picture below.



- 1 Calibration syringe C00600-01-11
- 2 Wrinkled tube A-108-300-012
- 3 ID18 turbine adapter C03047-01-20
- 4 Conic adapter C00063-01-20
- 5 ID18 turbine C02500-01-04
- 6 ID28 turbine C02560-01-04
- 7 Canopy Blower C03784-01-04

2. If you are calibrating the flowmeter for the test with Canopy, please connect the Canopy Blower to the turbine before starting the calibration, selecting at least a medium ventilation on the flow selector in order to decrease the blower resistance. During all the calibration, keep the button near the turbine always pressed and turn off the Canopy Unit in order to disable the alarms.



3. From the main menu, select **4.Utility/1.Calibration,**
4. In this menu, you can select **1.Default** to enter the factory settings, **2.Calibration** to perform a new calibration **3.Modify** to modify the current data, **4. Print** to print calibration results **0.Exit** to exit. In the event that the data is modified, the fields for date and time of the last calibration will no longer be reported.

1 Default 2 Calibration 3 Modify 4 Print 0 Exit

Calibration

Last Calibration	01/ -
Gain Exp	1000
Gain In	1000
Syringe(ml)	3000

5. If **2.Calibration** has been selected, start moving the piston of the syringe back and forth and perform 10 complete strokes (all the way in and out).

If calibrating the turbine for a RMR test, it is recommended that you perform the turbine calibration at the same rate that someone would breathe at rest (3-4 complete strokes per minute).

X.Cancel ✓.Confirm

Calibration

Vol.Exp(ml)	GAIN	Vol.Insp(ml)	GAIN
3043	985	2959	1013
2978	988	3022	1009
2984	990	3008	1008
3001	989	2996	1008
2994	990	2989	1009
2997	990	3000	1008
2999	990	3025	1007
3003	GainEx 990	GainIn 1006	
3003	990	3009	1006
3004	990	3006	1006

At the end the results are displayed and printed. Press **OK** to accept or **X** to cancel.

The 3-litres calibration Syringe may be purchased directly from COSMED (P/N: C00600-01-11).

Cleaning and disinfecting

The goal of infection control is to prevent the transmission of infection to patients/subjects and staff during pulmonary function testing.

Cleaning and disinfecting instructions should be strictly followed to control infections and assure the safety of the patient. Aspiration of residue, particles and/or contaminated agents could be life threatening.

The recommendations in the following section are retrieved from Miller MR, Crapo R, Hankinson J, et al.: General considerations for lung function testing. Eur Respir J 2005; 26:153–162.

► Prevention of infection transmission

Transmission to technicians

Prevention of infection transmission to technicians exposed to contaminated spirometer surfaces can be accomplished through proper hand washing and use of barrier devices, such as suitable gloves. To avoid technician exposure and cross-contamination, hands should be washed immediately after direct handling of mouthpieces, tubing, breathing valves or interior spirometer surfaces. Gloves should be worn when handling potentially contaminated equipment if the technician has any open cuts or sores on his/her hands. Hands should always be washed between patients.

Cross-contamination

To avoid cross-contamination, reusable mouthpieces, breathing tubes, valves and manifolds should be disinfected regularly. Mouthpieces, nose clips and any other equipment that comes into direct contact with mucosal surfaces should be disinfected, or, if disposable, discarded after each use.

Only the portion of the circuit through which rebreathing occurs must be decontaminated between patients, or, if disposable, discarded after each use. Disposable sensors, when appropriately used, avoid the need for decontamination of sensors and mouthpieces.

Tuberculosis

In settings where tuberculosis or other diseases that are spread by droplet nuclei are likely to be encountered, proper attention to environmental engineering controls, such as ventilation, air filtration or ultraviolet decontamination of air, should be used to prevent disease transmission.

Haemoptysis and oral lesions

Special precautions should be taken when testing patients with haemoptysis, open sores on the oral mucosa or bleeding gums. Tubing and breathing valves should be decontaminated before reuse, and internal spirometer surfaces should be decontaminated with accepted disinfectants for blood-transmissible agents.

Other known transmissible infectious diseases

Extra precautions should be taken for patients with known transmissible infectious diseases. Possible precautions include the following: 1) reserving equipment for the sole purpose of testing infected patients; 2) testing such patients at the end of the day to allow time for spirometer disassembly and disinfection; and 3) testing patients in their own rooms with adequate ventilation and appropriate protection for the technician.

Disposable in-line filters

These may be an effective and less expensive method of preventing equipment contamination.

The use of in-line filters does not eliminate the need for regular cleaning and decontamination of lung function equipment.

► Other precautions and warnings

Please take the following precautions during the cleaning and disinfection activities:

1. The responsibility for handling, cleaning and decontaminating reusable medical devices should be assigned to trained, qualified individuals.
2. Appropriate protective clothing (gloves, masks, eye protection, gowns) will minimize the potential for personal exposure to blood borne and other disease-producing organisms.
3. Immediately separate and contain soiled reusable devices at the point of use and transport to the decontamination area so as to minimize risk of personal contact with contaminants.
4. A disinfectant solution is only effective if it can contact all surfaces of the items to be disinfected or sterilized.

5. Adequate ventilation is required in the disinfection area to evacuate the chemical vapors from glutaraldehyde (if used). Use lidded containers for the disinfectant solution when appropriate. The inhalation of fumes from disinfectant solutions or skin contact with liquid disinfectants can be hazardous to personnel.

Warning: Particular precautions should be taken when testing patients with high risk communicable diseases (i.e. Tuberculosis, Multidrug Resistant Staphylococcus infections, etc.). When such conditions are present the clinical need for performing the test should justify the risks.

When performing the disinfection:

- Do not use alcohol or other liquids containing Gluteraldehyde on the exterior surface of the equipment.
- Do not use abrasive powders or glass cleaners containing alcohol or ammonia on the plexiglas component (mixing chamber or canopy) of the equipment.
- Do not steam autoclave any component other than rubber reusable masks (plastic adapter and clips should be removed).

Warning: Do not immerse any parts in liquid unless indicated (see following sections)

► Introduction

Decontamination is a multi-step process that includes preparation at point of use, thorough cleaning and rinsing and a microbicidal process. Thorough cleaning and rinsing are the first and most important steps in the reprocessing of any reusable medical device. Without thorough cleaning and rinsing it might not be possible to achieve high level disinfection or sterilization of the device. The purpose of cleaning and rinsing is to remove all adherent visible soil, to reduce the number of particulates and microorganisms, and to reduce the amount of pyrogenic and antigenic material. Any organic material, lubricants, or residual cleaning agents remaining on a device can inactivate liquid chemical disinfectants/sterilants as well as protect microorganisms from destruction.

The second step in decontamination is the microbicidal process which is defined as a process to provide a particular level of microbial lethality (kill). COSMED components are classified as "semi-critical" items which are devices that come into contact with intact mucous membranes. Semi-critical devices at a minimum require a high-level disinfection procedure. Sterilization is not absolutely essential.

COSMED components require complete or partial disassembly for cleaning and disinfection. It is the responsibility of the user (health care personnel) for ensuring that: the cleaning methods recommended can be duplicated in their environment, that appropriate tools, and replacement parts are available and that instructions are followed correctly.

► Cleaning

Note: Please refer to additional, specific cleaning instructions for the turbine assembly below.

Cleaning Agents/supplies

Mild detergents with a neutral pH (7) are recommended for cleaning. Use warm water (22°-43°C) with the mild detergent. To be effective, cleaning agents must assist in the removal of residual organic soil without damaging the device. Cleaning agents should be used in the correct dilution/concentration and at the correct temperature in accordance with the cleaning agents manufacturer's directions.

Cleaning supplies are very basic, usually consisting of a surgical scrub brush, chenille pipe cleaners, cotton or foam tipped applicators, soft brushes, and soft cloths. Cleaning supplies should be cleaned and disinfected or sterilized daily.

Water Quality: tap water is acceptable for use in cleaning COSMED components.

COSMED components should be soaked and rinsed in tap water at 22°-43°C to prevent the coagulation of solid substances onto the device and thus facilitate the removal of debris.

Enzymatic detergents with a neutral pH (7) are recommended when processing difficult-to-clean items with dried-on matter. Soaking mask and valve components in an enzymatic detergent solution can effectively remove visible debris except for lubricants thus providing an acceptable alternative to manual cleaning. Rinsing is necessary to remove all traces of detergent and extraneous debris.

Standard cleaning procedure

These steps are common to all the cleaning procedures

Step 1 Preparation at Point of Use. The cleaning of reusable items begins soon after use. At the point of use, personnel wearing gloves and other protective attire separate disposable items or components from reusable items and discard them in appropriate receptacles. Soil is wiped from device surfaces with a moist sponge or towel. The soiled/contaminated items are then contained in a manner that will reduce the risk of personal exposure to pathogens. Items are usually placed in a basket, tray or rigid container for transportation to the processing area, usually transported in or on a cart, as hand carrying of soiled items is discouraged.

Step 2 Inspection. Inspect the items for damage at all stages of handling. If damage is detected on any of the components it should be identified and documented. Complete the disinfection/sterilization process and contact technical service for replacement.

Step 3 Presoak. Protective attire is required of personnel handling contaminated items. At the processing area soak or rinse the items in tap water 22°-43° C. Please note that rinse with flowing water is not possible on the turbine. If an enzyme product is required, soak for one to two minutes. Remove and examine, extend the soak time for components with dried-on matter, prolonged soaking of components may be detrimental, causing damage to the component surfaces. Refer to the detergent instructions for its usage and soak time.

Step 4 Disassembly. Disassemble the item (if necessary) according to the instructions reported in the corresponding section.

Step 5 Cleaning. Protective attire is required for personnel handling contaminated items. Manual cleaning must be done in a manner that protects personnel handling the devices from aerosolization and splashing of infectious material.

1. Manual cleaning of the items should be done under 22°-43°C water. Use a neutral pH (7) mild detergent. Water hardness, temperature and the type of soil affect the effectiveness of the detergents; the detergent manufacturer's instructions should be consulted. Use a small soft brush to scrub all parts. Abrasive cleaning compounds and implements can damage the items and should not be used. Additional cleaning supplies may be required to clean stubborn stains or hard-to-reach areas.
2. Items must be thoroughly rinsed with clean water to remove the detergent residuals and debris from the components. Use a flowing triple rinse cycle at a minimum with tap water. Please note that rinse with flowing water is not possible on the turbine.
3. Dry all components thoroughly using soft clean clothes or disposable paper towels.

► Disinfection

The recommendations in this sections have been retrieved from:

William A. Rutala, Ph.D., M.P.H., David J. Weber, M.D., M.P.H., and the Healthcare Infection Control Practices Advisory Committee (HICPAC): Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008

(http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf)

High-level disinfection is the recommended decontamination procedure for semi-critical devices.

Devices are classified semi-critical when they touches mucous membranes or broken skin. Examples of semi-critical devices are flexible endoscopes, laryngoscopes, endotracheal tubes, respiratory therapy and anesthesia equipment, diaphragm fitting rings, and other similar devices.

Preparing the disinfecting solution

The recommended disinfection solutions are as follows:

- Sodium hypochlorite 0.5% (5000 ppm) prepared fresh for use within 24 hours.
- Sodium hypochlorite 1% (10000 ppm) prepared fresh for use within 30 days.

The first solution can be prepared by adding 1 part household bleach (sodium hypochlorite 5.25%) to 9 parts water. The second solution can be prepared by adding 1 part household bleach to 4 parts water.

► The turbine flowmeter

Guidelines recommend that the turbine should be cleaned and disinfected prior to every test to ensure accurate measurements and to comply with recommended sanitation measures as follow.

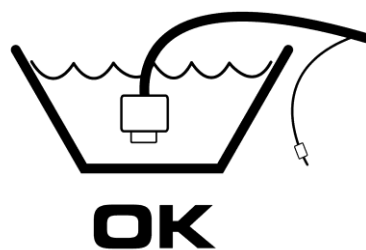
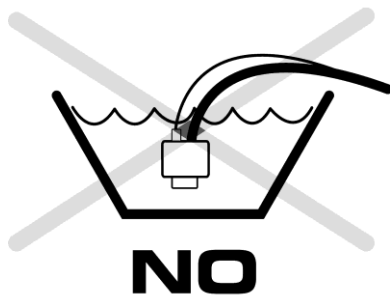
Cleaning the turbine

Follow the standard cleaning procedure reported above, paying attention to the following:

1. For rinsing, do not use flowing water, which may damage the turbine. Rinse the turbine in a vessel, filled of clean water, shaking gently to remove the disinfectant. Do not place the turbine under running water or move the turbine while submerged.
2. For cleaning and rinsing, do not wet the sampling line.
3. Use the brush (point 1 step 5) only for the external parts of the turbine, in order to avoid damages to the turbine blade.

Disinfecting the turbine

1. Disconnect the sampling tube from the reader.
2. Plunge the reader in a vessel containing the disinfectant solution for 20 minutes (see picture below) assuring that the sampling tube is not exposed to the solution (the optical flowmeter and cable are waterproof).



3. Rinse the turbine in a vessel filled with water and shake gently to remove the disinfectant (do not place the turbine under running water or move the turbine while submerged).
4. Allow the turbine to air dry (12 hours recommended depending on environmental conditions).
5. After cleaning the turbine, always calibrate prior to subsequent testing.

Disinfecting the turbine (for Canopy option)

1. Take out the turbine.
2. Dip it in a disinfectant solution (non alcoholic based) for about 20 minutes.
3. Rinse the turbine in a vessel, filled of clean water, shaking gently to remove the disinfectant (do not clean the turbine by putting it under running water!).
4. Let it dry to air.
5. After cleaning the turbine, check if the turbine propeller rotates freely even with a low speed air flow.
6. Connect the turbine to the reader.

Precautions to take when cleaning, disinfecting and drying the turbine

- Do not expose the turbine to high heat or to a direct flow of water.
- Do not expose the sampling tube or the connector on the end of the cable to any liquids.
- Do not use alcoholic solutions to clean the turbine.

▶ VO₂max mask and mixing chamber mask

Note: RMR masks used are disposable and for single subject use.

The face masks, adapters and other components should be cleaned and disinfected prior to every test. Sterilization can optionally be performed on the rubber mask only. High level disinfection of mask and components ensures patient safety and minimizes the risk of infection.

Disassembling the mask

Remove the round black turbine adapter held within mask and the clips that hold the headcap in place.

Cleaning the mask

Follow the standard cleaning procedure reported above.

Disinfecting the mask

Step 1 Disinfection. Use only liquid glutaraldehyde disinfectant solutions approved as sterilants/disinfectants by the National Authority.

Warnings

The fumes of glutaraldehyde can irritate the mucous membranes of eyes, nose and throat.

Some people develop allergic reactions to glutaraldehyde that can cause skin rashes, headaches and breathing difficulties.

Containers of glutaraldehyde should be kept closed and in a well ventilated area.

Gloves should be worn made of butyl or nitrile rubber. Do not use latex rubber gloves.

The concentration of glutaraldehyde in the air should not exceed 0.2 ppm.

For emergency, safety or technical information about the glutaraldehyde solution contact the manufacturer.

1. Determine the required soak temperature and time of the sterilant/disinfectant and assure that these requirements are met.

2. Activate the glutaraldehyde solution by mixing the components per the manufacturers instructions. Use the concentration testing devices sold by the manufacture to determine that the solution is above the minimum effective concentration.
3. Pour the activated glutaraldehyde solution into an appropriate sized basin.
4. Completely immerse the mask and components in the basin. Assure that all channels and cavities are filled with disinfectant and that no air pockets remain within the components.
5. Cover the disinfectant soaking basin with a tight fitting lid to minimize chemical vapor exposure.

Step 2 Rinsing. Adequate rinsing must follow disinfection to remove all traces of the toxic residues of the disinfectant left on the mask and components. Sterile water rinse is preferred over tap water. Tap water may contain a variety of micro-organisms which could recontaminate the components.

1. Rinse 1: Fill a basin with 7-8 liters of water (preferably sterile water). Place the mask and components into the basin and thoroughly rinse all the components for a minimum of one minute. Empty basin.
2. Rinse 2: Fill a basin with 7-8 liters of water (preferably sterile water). Place the components into the basin and thoroughly rinse all the components for a minimum of one minute. Empty basin.

Step 3 Hot water pasteurization: an alternative approach for disinfection (it can be performed in place of step 1 and 2). Completely immerse the device components in a hot water bath. All surfaces should be in direct contact with the hot water for 30 minutes at temperatures set between 71-76°C.

Step 4 Drying. To prevent the growth of waterborne organisms, the mask and components should be thoroughly dried prior to reassembly and storage.

1. Dry thoroughly using a soft cloth (preferably sterile) or disposable paper towels.

Step 5 Inspection. All components should be visually inspected for cleanliness, proper function and freedom of defects. Visual inspection provides evidence of thorough cleaning and proper functioning of all mask and components. Mask assemblies in poor working condition are hazardous to personnel and patients.

1. Visually inspect all components for cleanliness. If there are signs of residue from the detergent or disinfectant repeat the previous steps. If there are any signs of remaining stains or organic debris repeat the previous steps. If the cleaning and disinfection steps have been repeated with no improvement eliminating residual or stains etc, then dispose of the components and replace.
2. Visually inspect all components for defects. Check the rubber parts for tears, nicks, hardening or stiffening, deformation or distortion. Check the plastic parts for crazing, cracking or stripped threads. Any defective parts should be discarded and replaced.
3. Visually inspect all metal components for corrosion. Replace any metal components showing rust or chipped plated surfaces.

Sterilizing the mask

Sterilization of the silicone rubber face masks can be achieved with steam sterilization.

Warning: Sterilization can be performed on the rubber mask only. Do not apply sterilization on other parts.

Type of Cycle: Gravity Displacement

Type of Load: Wrapped Method

Temperature: 132°-135°C

Cycle Time: 10-15 minutes

Special Notes:

1. Follow cleaning procedures as instructed prior to steam sterilization. Since the degree of sterility assurance depends on the amount of contamination of items to be sterilized, thorough cleaning procedures are essential.
2. All lubricants should be removed from components because this will interfere with steam contact.
3. Dry devices (components) reduce the potential for wet device packs after sterilization.
4. Sterilization container systems should be cleaned after each use.

Reassembling the mask and components

Reassemble mask and components.

Use appropriate personal protective clothing to assure that you do not recontaminate the components.

► **Cleaning the headcap assembly**

Clean the head cap assembly (with strap clips) by hand washing with a mild detergent. Do not use bleach. Remove the head cap from the mask, leaving the strap clips attached to the straps. Machine or line dry. Do not iron the head cap assembly.

► **Cleaning and disinfecting the RMR canopy hood and veil (option)**

Cleaning hood and veil

The Canopy hood and the veil must be cleaned after every use by wiping with a soft cloth and a alcohol free solution.

Disinfecting hood and veil

Disinfect the parts following the instructions for turbine disinfection.

Sampling line maintenance (Permapure)

- Do not bend, squash or deform the sampling line. Any “kink” in the sample line will reduce the internal lumen of the line and affect accuracy of measurement.
- Do not keep the sampling line open to the atmosphere, particularly in crowded or smoky environments. Keep the sampling line in sealed plastic bag in a dark cool and dry place.
- If saliva enters the tube it should be replaced immediately.
- Periodically grease the O-ring on the connector to ease fitting to optical flowmeter.
- Replace the sampling line every 100 exercise tests or 200 PFT test or every 6 months. In any case, sampling line will become discoloured (brown) with age and may cause calibration to fail.

Note: *ALWAYS replace sample line as the first step in troubleshooting a failed gas calibration.*

Inspections

The equipment requires regular inspections to be carried out in order to ensure proper electrical and mechanical safety. These inspections are highly recommended after rough use of the equipment or after a period of storage in unfavourable environmental conditions.

Referring to the electrical safety, it is important to check the conditions of insulation of the cables, plugs and any other visible part by means of visual inspection, when the equipment is switched off and adapters (or electrical feeders) are disconnected from the power.

Mechanical parts to check are: the turbine and breathing circuits.

Follow these instructions:

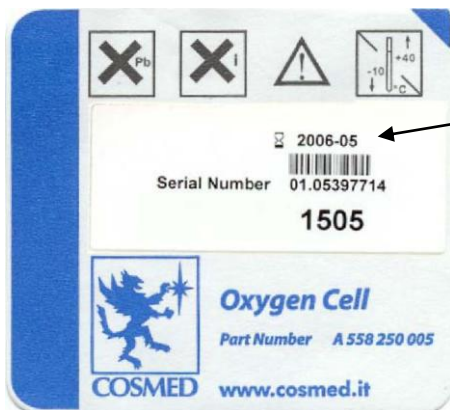
- Verify, by visual inspection, that the turbine axis fits correctly to its seats and the blade is strongly fastened on the axis itself (it can be useful to shake slightly the turbine in order to note any movement).

Check if there are any torn or broken components in the breathing circuit: remember that they can create a safety risk.

O2 Sensor installation and replacement

Note: The unit is supplied without the O₂ sensor installed. Before using the device, please install the O₂ sensor according to the instructions below.

The included O₂ sensor has an expiration date printed on the package as well as on the sensor itself indicating the latest date for the installation.



Expected Sensor Lifespan is about 12 months after the package is opened.

COSMED offers a 6 month warranty on the O₂ sensor from the date of purchase.

Important notice: Recommended replacing interval for the sensor is 12 months, the sensor should not be used after the expiry has elapsed. Replace the permature at the same time.

► Installation

To install the sensor, follow the procedures below:

1. Turn off the Fitmate and unplug it from mains.
2. Remove the cover located on the right side of the Fitmate.



3. Insert the sensor paying particular care to screw it in firmly, a coin may be used to turn the tool.



4. Connect the 3 pin connector.
5. Install the cover.

6. Calibrate the sensor to ensure proper functionality.

► Replacement

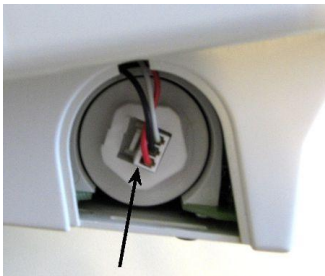
A warning message will appear on the screen to advise you when the O₂ sensor is about to expire and needs to be replaced.

To replace the sensor, follow the procedures below:

1. Turn off the Fitmate and unplug it from mains.
2. Remove the cover located on the right side of the Fitmate.



3. Remove the sensor connector.



4. Use the included O₂ sensor removal tool to unscrew the sensor, a coin may be used to turn the tool.



5. Install the new sensor paying particular care to screw it in firmly, a coin may be used to turn the tool.



6. Connect the 3 pin connector
7. Install the cover
8. Calibrate the sensor to ensure proper functionality.

Troubleshooting

Before contacting COSMED technical support, make sure that the following checks have been carried out.

<i>Preliminary operation on the Fitmate</i>		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
Fitmate does not turn on	Batteries are dead	Plug the Fitmate in and let it charge (the green LED will be on during charging).
Fitmate turns on correctly, but after few seconds it turns off	Batteries are dead	Plug the Fitmate in and let it charge (the green LED will be on during charging).
Fitmate turns on but the screen blank	One or more keys might be held down on the keyboard or the system needs to be reset	Verify whether keys are depressed. If necessary reset the unit by inserting the point of a pencil or a paper clip into the small "RESET" hole located in underside of the unit
Fitmate requires an activation code and turns off if pressing the X button	The 30-day time period before activation has passed	Contact COSMED for an activation code, following the instructions in this user manual
Although paper seems properly installed, no data is printed when selecting print test	The printer paper might be inserted on the wrong side or the green lever of the closing mechanism might be in the "open" position	Refer to the section on paper installation in this manual

Archive Management		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
I cannot view a patient that I know is in the Archive.	The display can only show the first 8 patients entered at once	To view more patients scroll using the up and down arrows of the navigator tool
The unit advises that the session will be terminated when selecting a test already performed in the current session.	One testing session cannot contain two tests of the same kind	If you don't want to terminate the current session, perform the tests not yet executed before repeating a test. However, it is not required to perform all the tests available for terminating a session
I cannot modify a subject's information in the Archive	Subject data cannot be modified once entered in the archive on the Fitmate	Enter e new subject. It is possible to delete a subject if necessary. You may modify information when downloaded to PC
it is impossible to enter the subject's date of birth	Fitmate manages both data format (dd/mm/yyyy and mm/dd/yyyy)	Be sure thet the proper format was selected (3.Options/4.Advanced)

<i>PC interface</i>		
<i><u>Problem</u></i>	<i><u>Cause</u></i>	<i><u>Solution</u></i>
The PC does not communicate with Fitmate when connected via a USB cable	The drivers necessary for the proper connection might not be installed properly	Check in the <i>Windows taskbar</i> whether the “Cosmed all models USB” device has been detected, If not or if an unknown device is listed, re-install the drivers from the CD supplied with Fitmate
PC cannot communicate with Fitmate	The settings (RS232 or USB ports) might be incorrectly configured on the PC or in the Fitmate unit	Select the proper settings (RS232 or USB) in the menu <i>Options/Settings of the Fitmate unit</i> and in the menu <i>Options/Setup...of the PC SW</i>

RMR Test with mask		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
A message “Impossible to calibrate” appears during automatic calibration	The Oxygen sensor might be not installed properly, or its lifespan has expired.	Check whether the sensor was installed properly (ensure it is tight). Check in the menu “utilities/O2 analyzer check” the sensor efficiency is exhausted, remove it and replace it. If a new sensor is not available, call COSMED.
All the accessories have been properly connected, the calibration passed, but there is still nothing on the screen	Tests do not start until the unit detects the first valid breath	Check if the optoelectronic reader is properly connected to the proper socket of the rear panel (indicated by the symbol <i>Turb</i>) and if the arrow near the mask on the display, shows the subject’s respiration.
The RMR values displayed appear to be low (<500) and the FeO ₂ values are high (>19.00%) when starting the test.	The first minute of the test is used to check whether the equipment has been properly setup and whether all the accessories are working fine. This minute is also used to wash out the sampling line. It is thus normal to detect RMR & FeO ₂ values different from what expected at the beginning of the test	Wait until this phase is completed (values are displayed every breath during this phase and every 30 seconds when the test starts). If this problem persists after the first minute, check if the sampling tube is properly connected on the rear panel of the unit.
The message “air leak detected check the face mask” appears during the test	The mask is probably loose	Connect the mask better to the subject’s face, pull the elastic strings. Leaks may occur around the bridge of the nose. If still leaks are detected despite the precautions adopted, use cotton or gel to improve the seal
The message “Expired oxygen not detected, check sampling line, be sure flowmeter is not reversed” appears during the test execution	The optoelectronic reader might be fixed in the reverse position, the sampling tube is loosing or oxygen sensor was not properly installed	Adjust the position of the optoelectronic reader. Check whether the sampling line has been connected properly, if not, correct it Check whether the O ₂ sensor was installed as described in this chapter
The message “values of the respiratory frequency are too high/low” appears during the test	The algorithm that manages the RMR test includes some automatic controls during the test execution. Thus if the respiratory frequency is out of the normal range, this warning messages will appear (e.g.: RF too high means that the subject is not totally relaxed)	Ask the patient to relax and slow down their respiratory rate (RF) if it is too high; Check whether the mask and the reader have been properly attached in case of too low RF
No HR values appear on the screen, although the HR probe is properly connected	The HR belt might not be connected or the electrodes of the HR Belt might have lost their conductivity, thus affecting the HR detection	Check whether the HR belt has been connected properly (see the dedicated chapter) saturate the electrodes with a conductive solution (or a salty solution) to improve the detection of the Heart signal
During the test, a warning indicates a wrong test mode	In option it is selected “Canopy”, while the test is performed with the mask	Abort the test and change the option.

The equipment displays zero values during test execution	The equipment discards all invalid steps (i. g. when an automatic calibration is being performed during the test, the breaths are discarded) from the calculation of RMR	Ignore these values, they will be printed on the report, but discarded from the final calculation
The green light located in the bottom right corner of the screen turns on from time to time during the test and the indicator in/ex (near the small mask) no longer matches the breathing rate	An automatic air calibration is being performed every 6 minutes. The frequency of the automatic calibration can be set from the menu <i>option/advanced</i> .	Ignore this event and keep going with the test (The algorithm that manages the RMR calculation will discard those steps). Do not remove the sampling tube from its position during the automatic calibration
The final printout displays only the final results; no step-by-step data are printed.	The <i>"print tabular results"</i> option is not activated	Activate the the <i>"print tabular results"</i> option in the Menu <i>"Otpion/adadvanced"</i>

RMR test with Canopy		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
It is not possible to perform the RMR test in Canopy mode	The Canopy can be used only with firmware 2.3 or higher; if you are using the Canopy, it must be enabled this option in Options/RMR menu	Be sure to use 2.3 or higher firmware release and, in case, select Canopy in Options/RMR
Before starting the test, although the Canopy is on and properly connected, the red led blinks and the alarm beeps	The Canopy is powered by the Fitmate only during the RMR test; if Canopy is not powered the alarm beeps	The Canopy unit must be turned on only when requested by the Fitmate (during the start phase of the RMR test)
Before starting the test, the yellow led turns on	The backup batteries in the Canopy unit are discharged or a wrong battery type is used	Replace the backup batteries in the Canopy unit. Use only alkaline not rechargeable AA 1,5V batteries
During the automatic acalibration before the test, the message "Calibration impossible" is prompted	The O ₂ sensor could be exhausted or not properly installed	Verify that the O ₂ sensor is present and that it is properly installed. Verify that the O ₂ sensor is efficient (by means of the analyzer check tool). If the sensor is exhausted, replace it
During the test, the red led blinks and the alarm beeps	A malfunctioning is detected	Verify that the turbine is properly connected to the blower and that the blower is properly connected to the hood. Verify that the power cable is properly connected to the Fitmate. Verify that the hood is ventilated.
During the test, a message warns that the exhaled oxygen is not detected.	The sampling line could be not properly connected.	Verify that the sampling line is connected to the <i>sampling</i> connector of the Fitmate and to the proper hole on the Canopy blower (near the hood).
Oxygen concentration is higher than oxygen concentration during RMR test with mask (FeO ₂ around 20%)	During RMR tests with Canopy, the oxygen is diluted with room air, and the oxygen concentration is around 20%	Continue test and follow the instructions if the oxygen concentration falls below 19.50% (increase ventilation)
Vp doesn't indicate the subject's ventilation during the test.	Vp is the pump ventilation and it is not related at all with the subject's ventilation.	It is not possible to measure the subject's ventilation.
During the test, messages indicate too high/low oxygen concentration	The oxygen concentration depends on the ventilation in the hood. The acceptable range is between 19,50 < FeO ₂ < 20,25	Adjust the ventilation and wait 30-45 seconds to check the effects.
During the test, a warning indicates a wrong test mode	In option it is selected "mask", while the test is performed with the Canopy	Abort the test and change the option.
Although the Canopy is connected to the Fitmate, no ventilation is detected during the test.	The Canopy unit could be off, or the ventilator could be not connected to the hood	Verify that the Canopy unit is on. Verify that the turbine is properly connected to the blower and that the blower is properly connected to the hood.
At the end of the test, before ending it, Fitmate beeps.	Beeps are sounded with the message indicating that the hood must be removed.	Remove the hood and end the test.

No HR values appear on the screen, although the HR probe is properly connected	The HR belt might not be connected or the electrodes of the HR Belt might have lost their conductivity, thus affecting the HR detection	Check whether the HR belt has been connected properly (see the dedicated chapter) saturate the electrodes with a conductive solution (or a salty solution) to improve the detection of the Heart signal
The HR probe is properly connected, but the displayed values are wrong	Perhaps some interferences occur.	Try to place the probe away from interference sources, such as monitors, mobile phones, electric cables, ...
During the test, some steps shows zero values.	If during a test invalid steps are detected (e.g. insufficient data), these are discarded from the final calculation and zero values are shown.	Continue the test without problems (the final printout will point out these steps).
During the test, the green led in the lower right corner of the display turns on occasionally.	During the test automatic air calibrations are performed every 6 minutes (this value can be modified in <i>Options/Advanced</i>).	Continue the test without problems. The sampling line must not be removed during the automatic calibration.
At the end of the test, the printout shows only the final results and it doesn't show all the steps.	The "all step" printout is not enabled.	Enable the printing of all steps in <i>Options/Advanced</i>

Body Mass Composition Test		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
The averaged values of the executed measurement with the skin fold calliper do not match the effective average of the measurements	The calculation for average skin fold is the following: the average of the closest two measurements, the outlier will be discarded.	Ignore the event and accept the value calculated by the SW
In case the body mass composition test is performed with the Skin fold calliper and with alternative equipment, only the percentage of fat, the screen will display and the printout will report only the Fat mass percentage measured with this alternative equipment	The SW has been design to record and print out only one body fat percentage per body composition test	In order to have n records for the same test but performed with n techniques, User will have to repeat the test as many times as the alternative techniques are, keeping in mind that a session terminates when the same test is repeated.
The body mass composition test terminates soon after the first measurement with the Skin fold calliper has been entered	The OK button has been most likely pressed after the first measurement has been entered	Use the “Down” arrows on the navigator tool to enter the measurements performed after the first one. Press OK only after all the measurements have been performed.

Standard measurement test		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
The hip and waist measurements have been entered but they are not reported on the final printout	The hip and waist values are only displayed on the screen. The test printout shows the hip to waist ratio.	
The abdomen measurement as been entered but it is not reported in the final printout	The abdomen measuremntn is only displayed on the screen.	

Weight management program		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
When entering a weight management program, the amount of calories for RMR is shown as 0 and keeps remains zero even after performing a RMR	The measured RMR is automatically entered in the weight management program if the test was performed before entering the required data in the program. If starting a weight management program before performing the RMR test, the measured value can no longer be entered in the weight management program	Execute the RMR test before performing the weight management program
In the PC SW weight management program, the amount of calories calculated by lifestyle shown in the final summary is zero even when lifestyle is specified on the proper section (This amount is, on the contrary, correct when entering the value measured with an <i>activity monitor</i> or a <i>pedometer</i>).	The calculation of the calories burned by lifestyle, once specified, is based on value of the RMR. If this value has not been entered, the algorithm will not calculate the value.	Enter a RMR value executing the RMR test (the value will be automatically imported) or directly typing the value
When specifying the exercise profile into the section "exercise". It is impossible to select more than one exercise modality.	Only one exercise modality can be selected when completing the "exercise" section	Select Other if more than exercise mode are to be selected and specify the amount of calories burned for each session

Cardio-respiratory Fitness VO₂Max(Fitmate Pro only)

<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
It is impossible to set a HR limit value to stop the test when test is in "Maximal" modality	The cardiorespiratory fitness test does not include this option when in "Maximal" modality.	In case the test in "Maximal" modality is interrupted before the exercise reaches maximum, then VO ₂ Max cannot be extrapolated. This option is only available in the "sub-maximal" test.
The message "wrong reader" appears on the screen after pressing OK for starting the test	To execute a VO ₂ Max test use the VO ₂ max reader (28 mm), not the RMR reader (18mm) is required.	Press X, remove the small reader and connect the big one.
The message "impossible to calibrate" appears during the automatic calibration phase starting before the test"	The O ₂ sensor might not be installed properly or it is totally exhausted	Check the O ₂ sensor position and if it is properly installed as indicated in this chapter. Check the efficiency in the menu of the O ₂ cell. If the analyzer is exhausted replace it.
No values are displayed on the screen although the calibration was successful and all the accessories are connected.	The RMR test does not start until the unit detects the first valid breaths	Check if the optoelectronic reader is properly connected in the proper socket of the rear panel (indicated by the symbol <i>Turb</i>) and if the arrow near the mask in the display, follows the subject's respiration.
The FeO ₂ values displayed are too high (>19.00%) when starting a test.	The first minute of the test is used to check whether the equipment has been properly initiated and whether all the accessories are working properly. This minute is also used to wash out the sampling tube. It is thus normal to detect FeO ₂ values different from what expected at the beginning of the test	Wait till this phase is completed (values are displayed every breathe, during this phase and every 30 seconds when the test starts). If this problem should persist even after the first minute, check if the sampling tube is properly fixed in the rear panel of the unit.
The message "air leak detected check the face mask" appears during the test execution	The mask is most probably loose	Secure the mask better to the subject's face, pull the elastic strings. Leaks will usually occur around the nose. If leaks are still detected despite the precautions adopted, use cotton or gel to improve the seal
The message "Expired oxygen not detected, check sampling tube, be sure flowmeter is not reversed" appears during the test execution	The optoelectronic reader might be connected backwards, the sampling tube is loose or oxygen sensor was not properly installed	Adjust the position of the optoelectronic reader. Check whether the sampling tube has been connected properly, if not, correct it Check whether the O ₂ sensor was installed as described in this chapter
No HR appears on the screen, although the HR probe is properly connected	The HR belt might be not attached properly or the electrodes of the HR Belt might have lost their conductivity, affecting the HR detection	Check whether HR belt has been attached properly (see the dedicated chapter) saturate the electrodes with a conductive solution (or a salty solution) to improve the detection of the Heart signal

The HR probe is properly connected but the values displayed are too variable	Some external signal might disrupting the transmission	Ensure that the probe is as far as possible from interfering sources (computer monitor, telemetry devices, electrical cables, mobile phones....
The equipment displays some zero values during test execution	The equipment discards all the invalid steps (i.e. when a calibration is being automatically executed during the test, the breaths are discarded) from the final calculation of the averaged data	These invalid values, even though they are on the printout, will not be used to calculate the final values
The green light located in the bottom right bottom corner of the display turns on from time-to-time during the test and the indicator in/ex (near the small mask) no longer matches the breathing rate	An automatic air calibration is being performed every 6 minutes. The frequency of the automatic calibration can be set from the menu <i>option/advanced</i> .	Ignore this event and continue with the test (The algorithm that manages the test will discard those steps from the final calculation). Do not remove the sampling tube from its position during the automatic calibration
During test execution a red signal turns on in the bottom right side of the screen.	The red signal indicates that no other automatic calibrations will be carried out from the moment it turns on to the end of test. No important data are lost during the critical part of the test where the VO ₂ Max is calculated	Ignore the signal and continue with the test
Impossible to display the data concerning load and the entered values of Blood pressure and RPE	The size of the display does not allow to visualize all data;	Scroll through the data using the navigator tool (Up and down arrows)
The final printout displays the final results; no step-by-step data is printed.	The <i>"print tabular results"</i> option is not enabled.	Activate the <i>"print tabular results"</i> option in the Menu <i>"Options/advanced"</i>
The test is terminated normally but the value of VO ₂ max extrapolated is 0 or less than what was measured during the test	The last stage of the exercise protocol was too short (less than 3 minutes) consequently the calculation of the extrapolated VO ₂ is wrong	Select the exercise protocol keeping in view the subject's exercise limitation.

Muscular Fitness (Fitmate Pro only)		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
It is not possible to enter more than 10 reps for the test of muscular strength	It is only possible to enter up to 10 reps.	If it is possible to perform more than 10 reps, the test is not at the maximal intensity (invalid). Increase the weight to lift up to the weight which allow up to 10 reps.

<i>Flexibility (Fitmate Pro only)</i>		
<u><i>Problem</i></u>	<u><i>Cause</i></u>	<u><i>Solution</i></u>
It is only possible to enter one measurement for the test of flexibility.	The assessment of flexibility is performed based solely on the best test performed	If performing more than one test, enter the best result achieved only.

Activity caloric cost (only Fitmate Pro)		
<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
The message “wrong reader” appears on the screen after pressing OK to start a test	To execute a VO ₂ Max test, you are required to use the large turbine (28 mm).	Press X to cancel, remove the small reader and connect the large one.
The message “impossible to calibrate” appears during the automatic calibration phase before a test”	The O ₂ sensor might not be installed properly or totally exhausted	Check the O ₂ sensor to ensure it is properly installed. See the O ₂ sensor section of this chapter. Check the efficiency of the O ₂ cell in the O ₂ cell menu. If the analyzeranalyzer is exhausted replace it.
No values are displayed on the screen although the Fitmate calibrated and all the accessories are connected.	The RMR test does not start until the unit detects the first valid breath	Check if the optoelectronic reader is properly connected in the proper port on the rear panel (indicated by the <i>Turb</i>) and if the arrow near the mask in the display, follows the subject’s respiration.
The FeO ₂ values displayed are too high (>19.00%) before starting the test.	The first minute of the test is used to check whether the equipment and accessories are properly working. This minute is also used to wash out the sampling tube. It is thus normal to detect FeO ₂ values different from what expected at the beginning of the test	Wait until this phase is completed (values are displayed every breath, during this phase and every 30 seconds when the test begins). If this problem persists even after the first minute, check if the sampling tube is properly attached to the rear panel of the unit.
The message “air leak detected check the face mask” appears during the test.	The mask is most likely loose	Secure the mask better, either by moving the mask or by tightening the elastic straps. Leaks commonly occur at the bridge of the nose. Have the subject tell you if they feel air escaping into their eyes. If the problem persists, you can use
The message “Expired oxygen not detected, check sampling tube, be sure flowmeter is not reversed” appears during the test execution	The optoelectronic reader might be attached backwards, the sampling tube is loose or oxygen sensor was not properly screwed	Adjust the position of the optoelectronic reader. Check whether the sampling tube has been attached properly, if not, correct it Check whether the O ₂ sensor was installed as described in the specific chapter
No HR values appear on the screen, although the HR probe is properly connected	The HR belt might be not attached properly or the electrodes of the HR Belt might have reduced conductivity, effecting the HR detection	Check whether HR belt has been attached properly (see the dedicated chapter) eventually saturate the electrodes with a conductive solution (or a salty solution) to improve the detection of the heart rate signal a
The HR probe is properly connected but the values displayed are too variable	Some external signal might interrupt the transmission	Make sure that the probe is far from possible interfering sources (monitor, telemetry devices, electrical cables, mobile phones....

The equipment displays some zero values during the execution of the test	The equipment discards all the invalid steps (e. g. when a calibration is being automatically executed during the test, the breaths are discarded) from the final averaged calculation	Ignore these values, which will be reported on the printout, however, they will be marked as an invalid step and discarded from the final calculation
The green light located in the bottom right part of the display turns on from time to time during the test and the indicator in/ex (near the small mask) no longer matches the breathing rate	An air calibration is being automatically performed every 6 minutes. The frequency of the automatic calibration can be set from the menu <i>options/advanced</i> .	Ignore this event and keep performing the test (The algorithm that manages the test will discard these steps from the final calculation). Do not remove the sampling tube from its position during the automatic calibration
In the printout the energy expenditure for each test phase is not reported	For each test phase METS values are reported. The energy expenditure reported is relative to the entire test.	
The maximum HR for each phase is not the one measured.	The maximum HR reported in the printout (for each phase) is the peak for the whole test. For each phase is HR reported the mean.	

Installation and Activation of Software

Installation of software

Note: PC software can be installed only on Windows XP, Windows Vista or Windows 7.

► Installation of software

Warning: in order to properly install the software, the user must have full control of the PC (with Administrator rights). Otherwise, the software doesn't work.

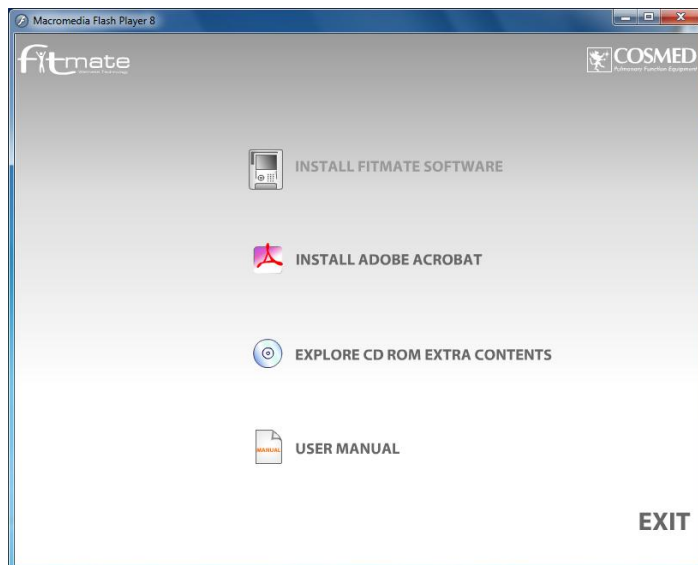
1. If on the PC is installed a previous version of the software, please remove it (from Windows Control panel) before installing the new version.

Warning: Uninstalling the software, PC will ask you if you want to delete the archives.

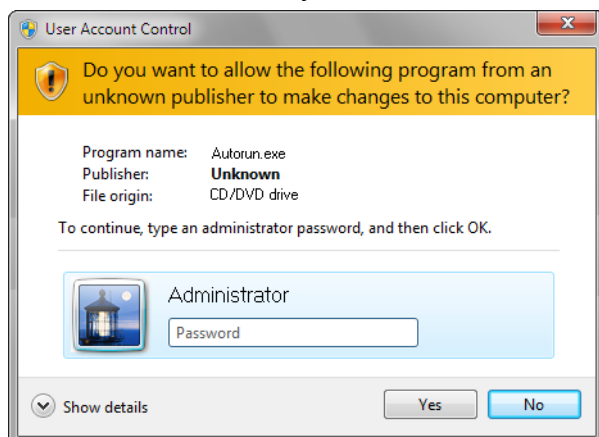
2. Insert the Installation CD supplied with the equipment in the proper drive.



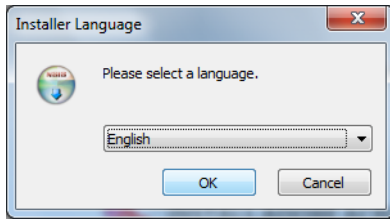
3. A window will ask the user the action to be performed. Select *Install COSMED Fitmate*.



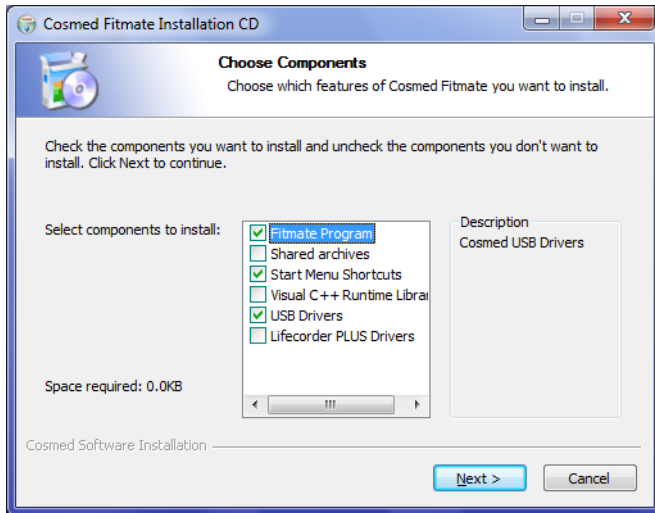
4. Select *Install Fitmate Software*.



5. (Windows 7 only) If you didn't log in as Administrator, enter the Administrator's password. This is a Windows 7 protection system and it cannot be bypassed.



6. Select the installation language. The software language can be chosen later.



7. Select the components to be installed:

Fitmate Program: it cannot be deselected and it must be installed in any case

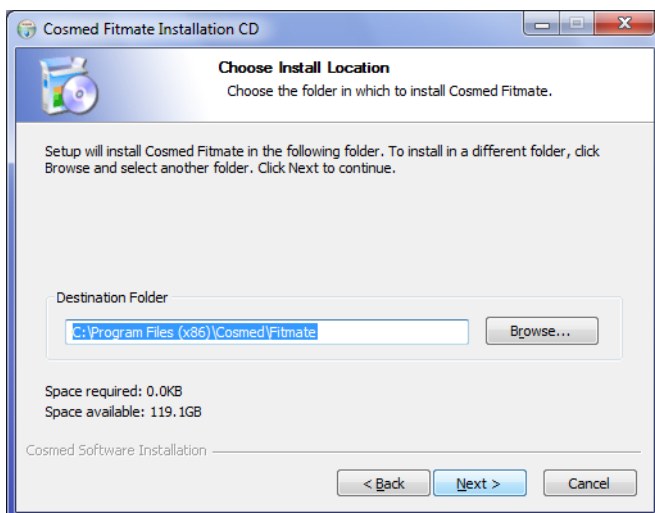
Shared Archives: to install the shared archives. They will need a shared folder (by means of the standard Windows function). If you don't select this option, the archives will not be shared. This option can be modified from the Fitmate settings. See later (*Installing and using shared archives*) for further details.

Start Menu Shortcuts: to create links in the Windows Start menu

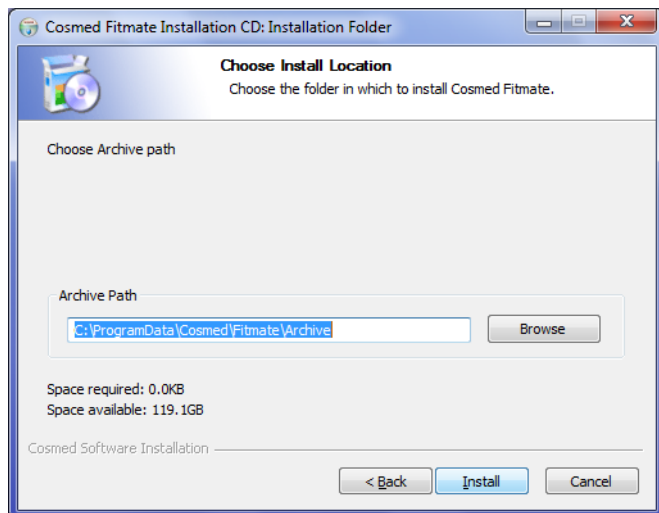
Visual C++ Runtime Library: if needed, it is automatically selected

USB Drivers: to install the Cosmed USB drivers (not needed if a USB dongle is used).

Lifecorder PLUS Drivers: to install the Lifecorder Plus drivers.

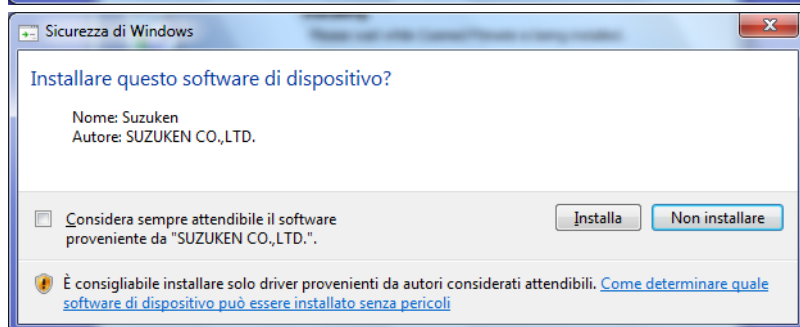
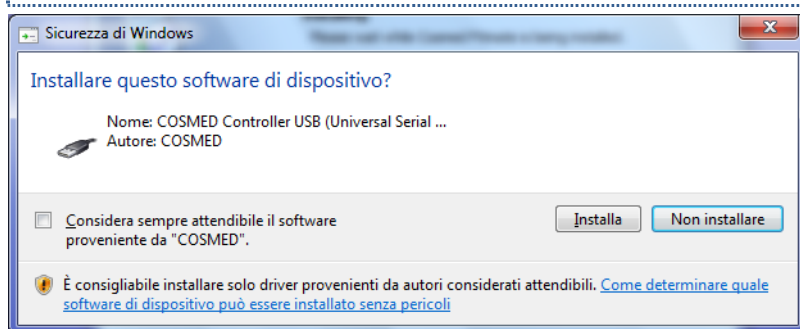


8. Select the installation folder.

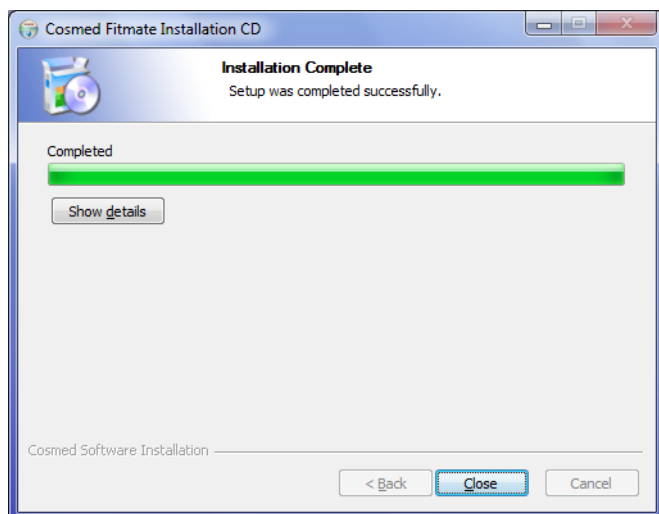


9. Select the archive folder. The recommended folder is the default one.

Note: It is not possible to put the archives in the Program Files folder (when the software is installed). In case, the installation program will show an error message.



10. Install if needed the USB drivers.



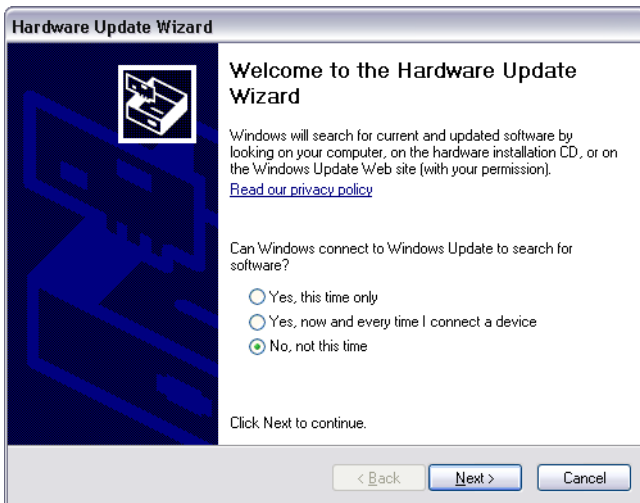
The software is now installed. Reboot the PC.

Note: the software is protected. Perform the installation always with the original CD.

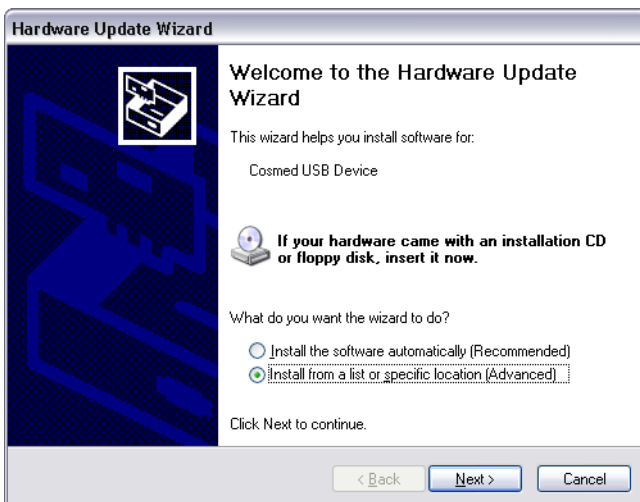
► Installation of the Fitmate USB driver

Windows XP

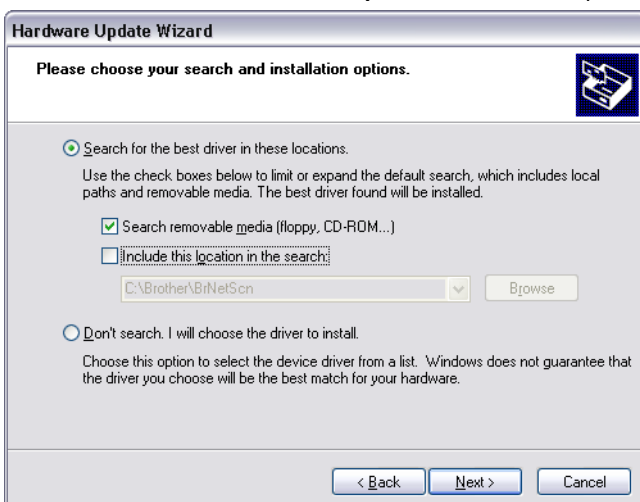
1. Insert the Installation CD in the proper driver
2. Connect Fitmate to the PC through the USB cable. The guide to install the HW will open up.



3. Answer **No** to the question *Allow the connection to Windows update to look for new software?*



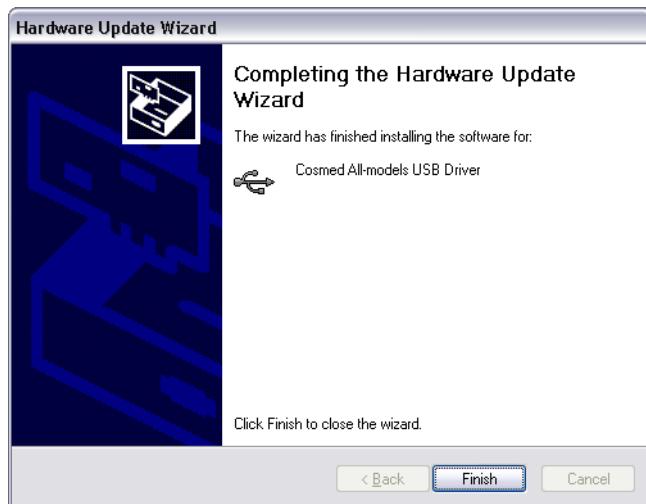
4. Select **Install from a list or a specific location** and press **Next>**



5. Select **Search removable media** and press **Next>**



6. During the installation the warning message shown above will appear if a hardware device driver is not submitted or does not qualify for Microsoft certification. This is a message from Microsoft encouraging your company to submit hardware solutions for certification. COSMED drivers will not impair or destabilize your computer. You may choose to ignore this message and select **Continue anyway**.



7. The drivers are now properly installed.

Windows Vista/Windows 7

The installation of the Fitmate USB drivers in Windows Vista or Windows 7 is fully automatic.

► Installation of the Lifecorder Plus Activity Monitor USB driver

The Lifecorder Plus (code A-661-115-001) is an activity monitor useful in the Weight Management Program. It can be controlled by the Fitmate software and its data can be downloaded into the Fitmate software.

Attention: Only the Lifecorder Plus which is compatible with Fitmate software works properly with the Fitmate. Other Lifecorder Plus devices don't communicate with the software and cannot be used with the Fitmate. Please refer to COSMED to purchase a Lifecorder Plus compatible with Fitmate software.

In order to install the drivers, please connect the Lifecorder Plus to the Pc through a mini-B USB cable (not included, code A-362-315-004) and put the Fitmate software CD into the CD-driver. The guide to install the HW will open up.

Windows XP

Please follow the same procedure as for the Fitmate drivers.

Windows Vista/Windows 7

The installation of the drivers in Windows Vista or Windows 7 is fully automatic.

► Verify the proper installation of the USB drivers

In order to verify the proper installation of the USB drivers in the PC, please connect the Fitmate to the PC and turn on the unit.

Windows XP

Right-click on the *My computer* icon and select *Properties*.

In the *Hardware* tab, select *Device manager* and check, among the USB controllers, that the “Cosmed All-models USB driver” is present and does not have a yellow marker.

In case the driver is not properly installed, please uninstall and reinstall it.

Windows Vista

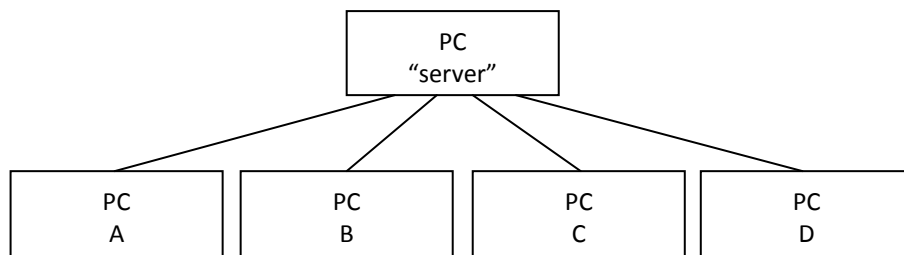
Enter in the PC Control Panel and double click on the *System* icon.

Select *Device Manager* and check, among the USB controllers, that the “Cosmed All-models USB driver” is present and does not have a yellow marker.

In case the driver is not properly installed, please uninstall and reinstall it.

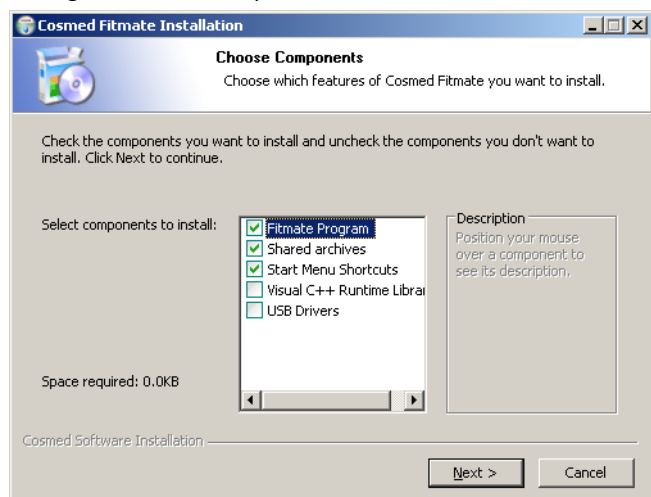
► Installing and using shared archives

PCs can share the archives over a network. Shared archives are stored on a PC (the “server”), while the other PCs enter into it in order to read and store tests.

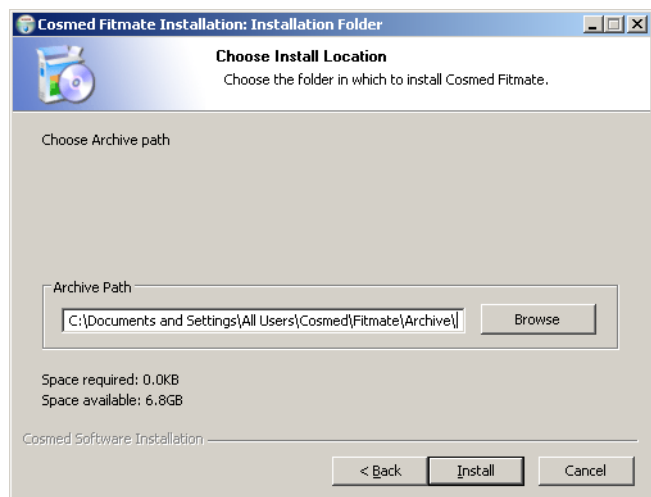


The software must be installed first on the “server” PC, and then on the other PCs.

In order to install the Fitmate software with the archives shared, it is necessary to select the checkbox *Shared archives* during the installation procedure.



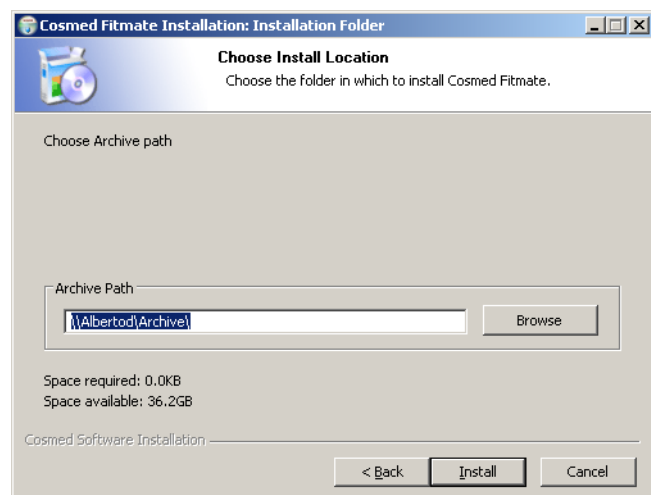
During the installation procedure on the “server” PC, select the folder where the archives must be stored.



When the software is installed in the “server” PC, please share the *Archive* folder (in the folder where you stored the archives) with the other PCs, giving both reading and writing rights. Since the sharing procedure depends on the used

Operating Systems and on the PC configuration, please refer to your network administrator if you experience troubles in sharing folders.

During the installation procedure on the other PCs, be careful to select the exact archive path in the “server” PC.



Important notice: Be careful, each PC (both the “server” one and the other ones) has the same rights in order to read, write and modify the archives.

Remember that each installed software (on each PC) must be authorized at least every 30 days by connecting an activated Fitmate.

► Run the software

Once the installation is terminated, click on the icon **Fitmate** from the menu **Start/Cosmed** to run the program. Software runs automatically when Fitmate is connected to the PC (if selected in **Options/Setup...**).

Alternatively:

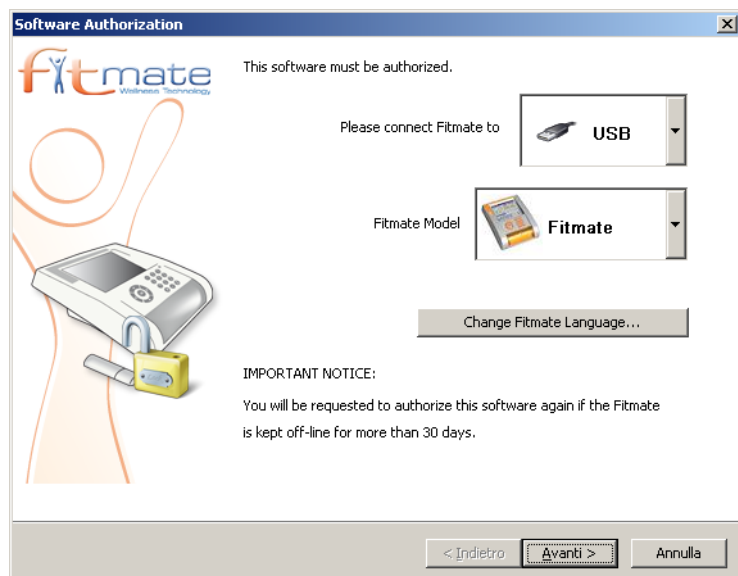
1. Select from the Windows start menu select Start/program/Cosmed.
2. Click on the Fitmate icon.

Activation of SW

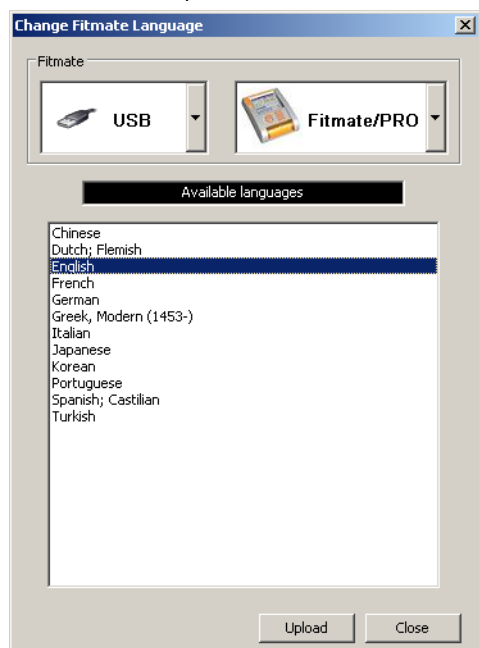
PC Software program is automatically activated when connecting a Fitmate **previously activated**.

This activation expires after 30 days, but it is automatically renewed anytime Fitmate is re-connected to the PC. A warning message appears on PC advising user when this period is about to expire and another connection is necessary.

The Software version enabled on PC is that one indicated in the activation code. In case of Software upgrade, it will be necessary to request a new activation code from COSMED as illustrated in the section *Product registration* in Chapter 3" *Installation*".

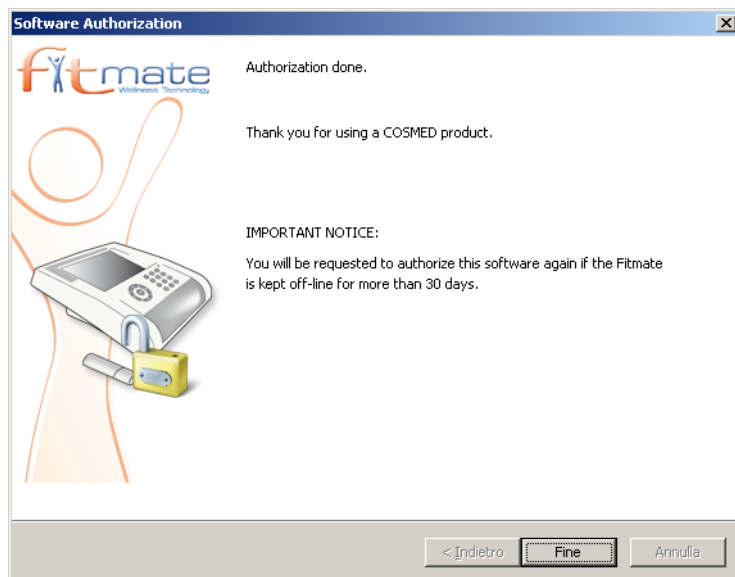


You can change the Fitmate language (on the unit) pressing the **Change Fitmate Language...** button. Otherwise select the communication port and the Fitmate model and press **Next>** to authorize the software.



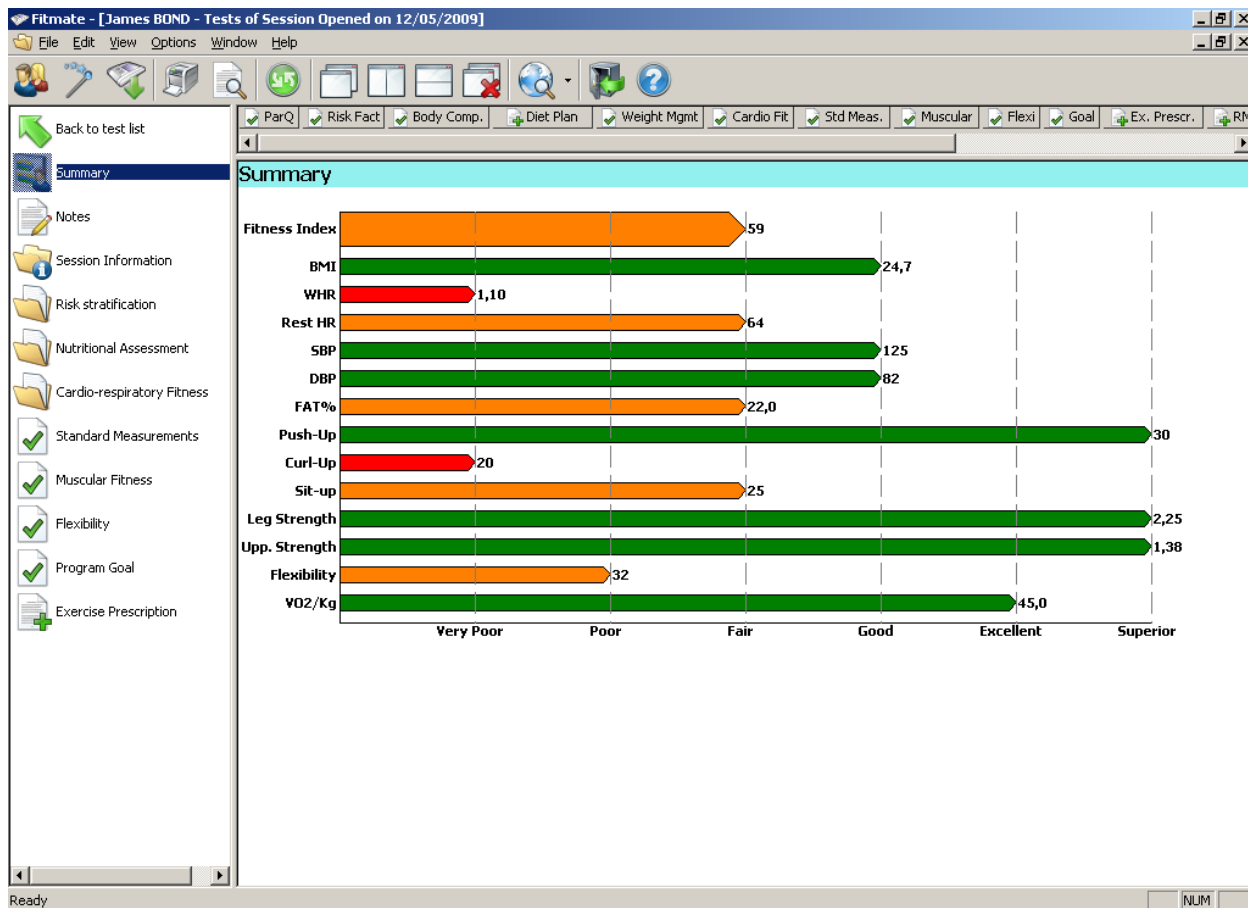
Select the communication port, the Fitmate model and the language. Press **Upload** to transfer the language, **Close** to cancel the operation.

Note: Besides English, only one more language can be uploaded in the Fitmate.



User Interface and settings

User Interface



Display

Different windows may be displayed at the same time. The active one is highlighted with a different colour. Some typical window functions are "context sensible" to the active window (Print, right button of the mouse).

Tool bar

Operator may enter all the functions from the menu. Many functions are alternatively accessible clicking on the related icon on the tool bar.

A brief description will appear when pointing an icon with the mouse (if the option help is enabled).

Show/hide the toolbar

Select **Toolbar** from the menu **Options** to show or hide the toolbar.

Dialog windows

Typical of the windows environment is the interface with dialog box to fill in with the information requested.

Use of the keyboard

- To move through the fields of a dialog box press Tab till the desired field is reached
- Type in the field the related information with the keyboard
- Press enter to confirm the information or Esc to quit the window.

Use of the mouse

- To access a field of a dialog box with the mouse, left click when the mouse pointer is on the desired field and then type the information.
- Click OK to confirm the information typed or Cancel to quit the window.
- The right button of the mouse allows the execution of the main operations and it is sensible to the active window (modify, print, etc...).

► Scroll bars

Some dialog windows have a scroll bar that allows the visualization of the information exceeding the space available.

- To move through the bar click on the arrows located on the bar.

► Help on line

Pressing the **F1** button or selecting the from the menu **Help/On-line Help** operator accesses the user manual.

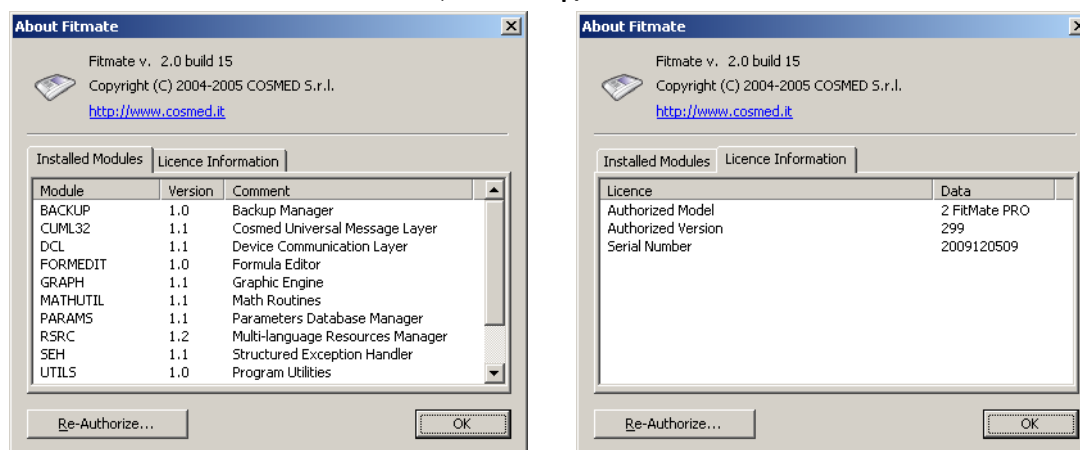
Tips

Helpful tips are displayed if selecting **Help/Tip of the day** from the menu

The equipment may be configured to have the tips automatically shown at the start-up.

► Version of the program

To view information about the software, select **Help/About Fitmate**.



Installed Modules shows information about the installed SW modules and their version, *Licence Information* shows information about the SW activation.

Click on **Re-Authorize...** to reset to 30 the days remaining before new authorization request. It will be necessary to connect a Fitmate.

Settings

► Configuration

Select **Options/Setup....** A window listing the possible device configurations will pop up: select your settings.

Setup

Setup

Unit of measurement: Kg and meters

Cholesterol Units of meas.: mg/dl

Background: None Browse...

Spirometry Predicteds: ERS 93

☒ Print Diagnosis

☒ Print Nutrition Facts Report

☒ Print Warnings

Training Zones Setup

Fat Burning/Recovery Zone starts: 35 % of VO2max

Endurance Zone starts at: 56 % of VO2max

Threshold Zone starts at: 81 % of VO2max

RacePace Zone starts at: 91 % of VO2max

VO2max Zone starts at: 96 % of VO2max

Anaerobic Zone starts at: 101 % of VO2max

Anaerobic Zone ends at: 105 % of VO2max

☒ Print Training Zones Elite Zones

OK Annulla Applica

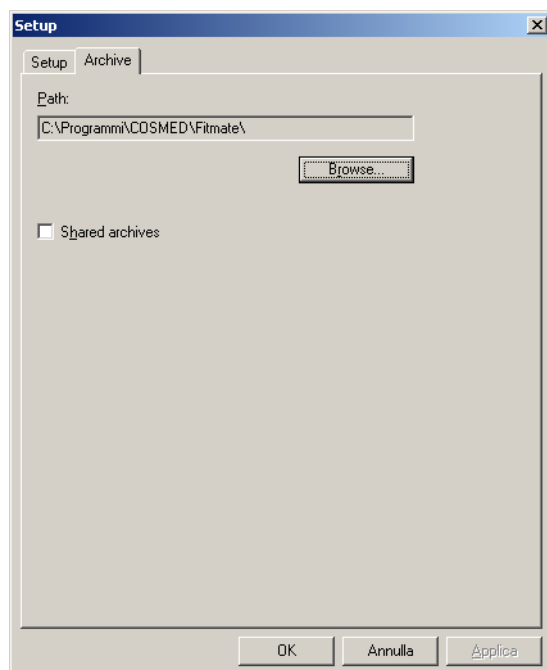
The *Training Zones Setup* section is different depending on the device and the Training Zones set selected.

It is possible to configure:

- the unit of measurement (kg/meter or inch/pound)
- the cholesterol units of measurement
- the background
- the spirometry predicted set (Fitmate Med only)
- if the printing of the diagnosis is enabled/disabled (Fitmate Med only)
- if the printing of a report on the nutrition facts (in the Weekly Diet Planner test) is enabled/disabled
- if the printing of the warnings is enabled/disabled
- the training zones (this part is different depending on the device and the Training Zones set selected)
- if the printing of the training zones is enabled/disabled

Note: changing the Training Zones will modify these values in all the new subjects. Training zones for each subject can then be changed for their limiting values, but not for the set selected.

Archive



Type the path where all the data will be will memorized

Thick the check box *Shared Archive* if wishing to share the archive in a network.

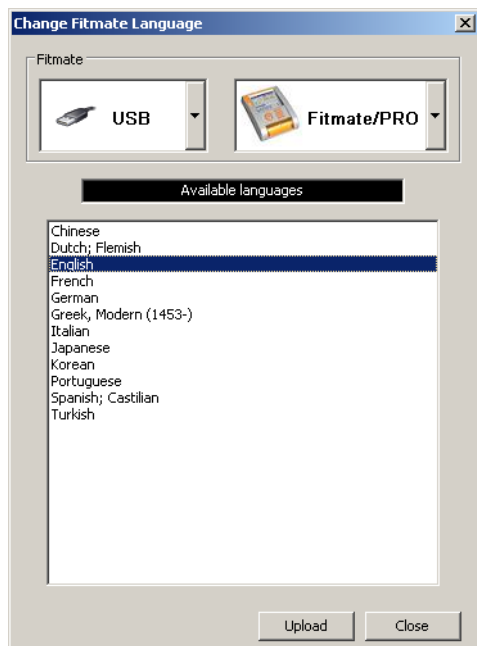
► Language of the software

Selecting **Options/Language...** a windows, listing the alternative languages available, will pop up. Select the desired one.



► Change Fitmate language (unit)

To change the language of the Fitmate unit, select **Options/Change Fitmate language....**

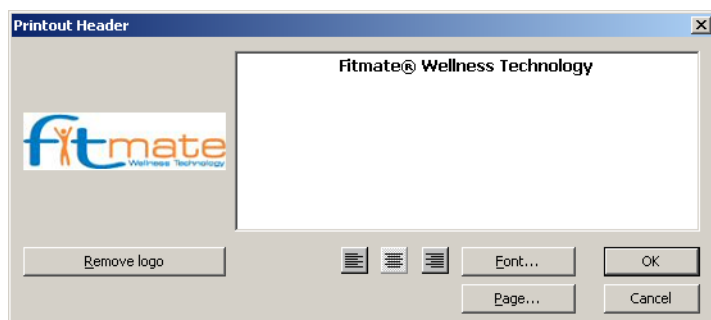


Select the communication port, the Fitmate model and the language. Press **Upload** to transfer the language, **Close** to cancel the operation.

Note: Besides English, only one more language can be uploaded in the Fitmate.

► Printout Header

The page heading may be modified selecting **Options/Printout header....**

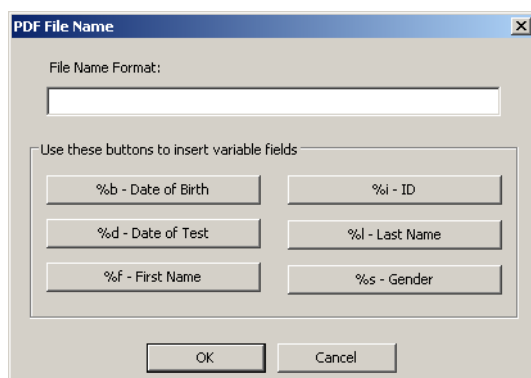


Press **Remove logo** to remove the selected logo. To add a new logo, click on the logo.

Press **Font...** to select the font of the printout header, and **Page...** to set the page (size, margins,...).

► Pdf file name

The Fitmate software allows to set the predefined pdf file name (in case of pdf printing), by selecting **Options/PDF file name....**



Press the buttons in the lower section to enter one of the fields.

If the format selected is, for example: "%d - %l %f", the filename will be composed by <date of the test>, space, line, space, <last name>, space, <first name>.

This tool is very useful for network archiving data, particularly when the central unit requires that the file name is formatted in a specific manner.

Software features

Subject archive management



Select **File/Subject manager** to access subject database, or click the quick icon illustrated here by side.

A new window will allow the execution of a number of operations.

Member ID	Last Name	First Name	Date of B...
	BOND	James	04/03/1967

Select or deselect the check box *Show this window when the program starts* if you want this window when you start the program or not.

► Enter a new subject in the archive



To enter a new subject in the archive, click on the related icon, type in the data required and click **OK** to confirm.

Fat Burning Zone starts at:	35	% of VO2max
Endurance Zone starts at:	51	% of VO2max
Threshold Zone starts at:	76	% of VO2max
VO2max Zone starts at:	91	% of VO2max
VO2max Zone ends at:	100	% of VO2max
Anaerobic Zone starts at:	101	% of VO2max
Anaerobic Zone ends at:	105	% of VO2max

Enter the data requested. If this subject must manage training zones different from the ones set in the general settings, type their ranges in the lower part of the window.

To add a photo click on the squared located on the top right and then browse to select the photo.

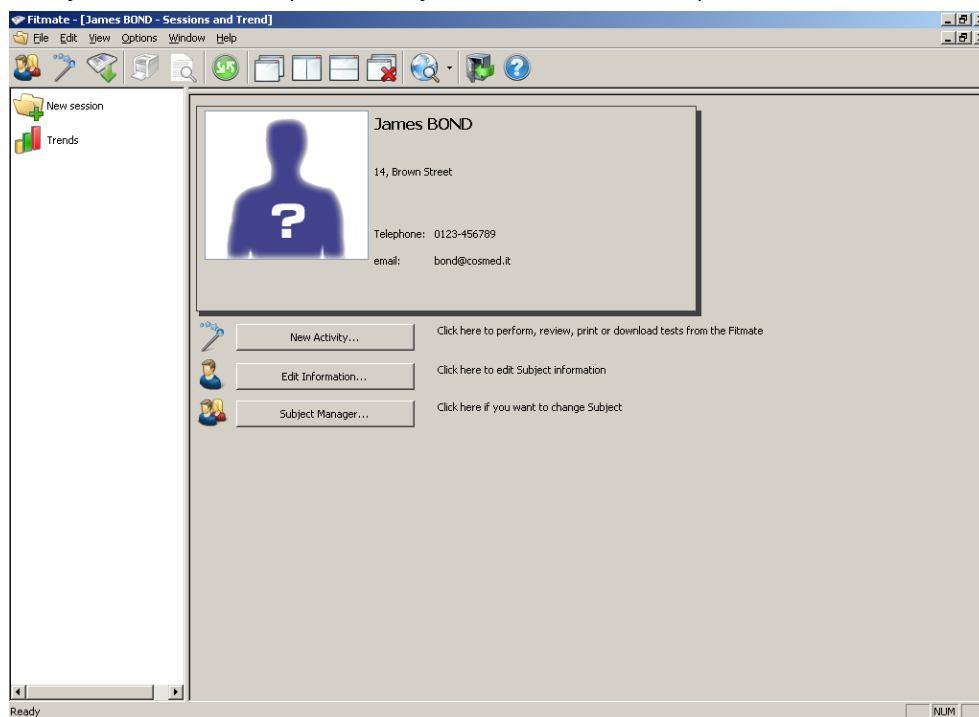
► Select an existing subject



The list of the subject in the archive is displayed on the right side of the window, to select a subject highlight one record and click on the icon **Open subject's sessions** or double left click on the selected subject.

Every subject can easily be traced through the navigator (top side of the window) by selecting the searching criteria and typing name or ID code in the field by side.

A subject card will show up all the subject information and test performed.



The following icons will appear in the left side of the window:

Icon	Click	Double click
	-	Create a new session
	Show the trend	-
	Show the summary of the session (already closed)	Enter in the session (already closed)
	Show the summary of the session	Enter in the session

► Modify the data of an existing subject



Select a subject from the list and click on the related icon.

Modify any information contained.

► Delete a subject from the archive



Select a subject from the list and click on the related icon.

Testing session manager

One or more testing sessions are linked to any subject in the archive. A single testing session consists of a number of tests performed or questionnaire filled in not necessarily in the same day. A single testing session cannot contain two test of the same kind. The session closes up automatically and no other test can be added to that session if executing a test already performed.

► Create a new session



Select a subject from the list, and double click on the icon “New session”.

Complete the information in the dialog windows that appears. HR max can be confirmed at 220-Age (default value) or modified in order to obtain a more accurate estimation of VO₂max during submaximal protocols.

Warning: if medications for BP/HR are assumed, reduce HR max by at least 20 bpm.

The dialog box titled "Session information" for "James BOND - Sessions and Trend" contains the following fields and controls:

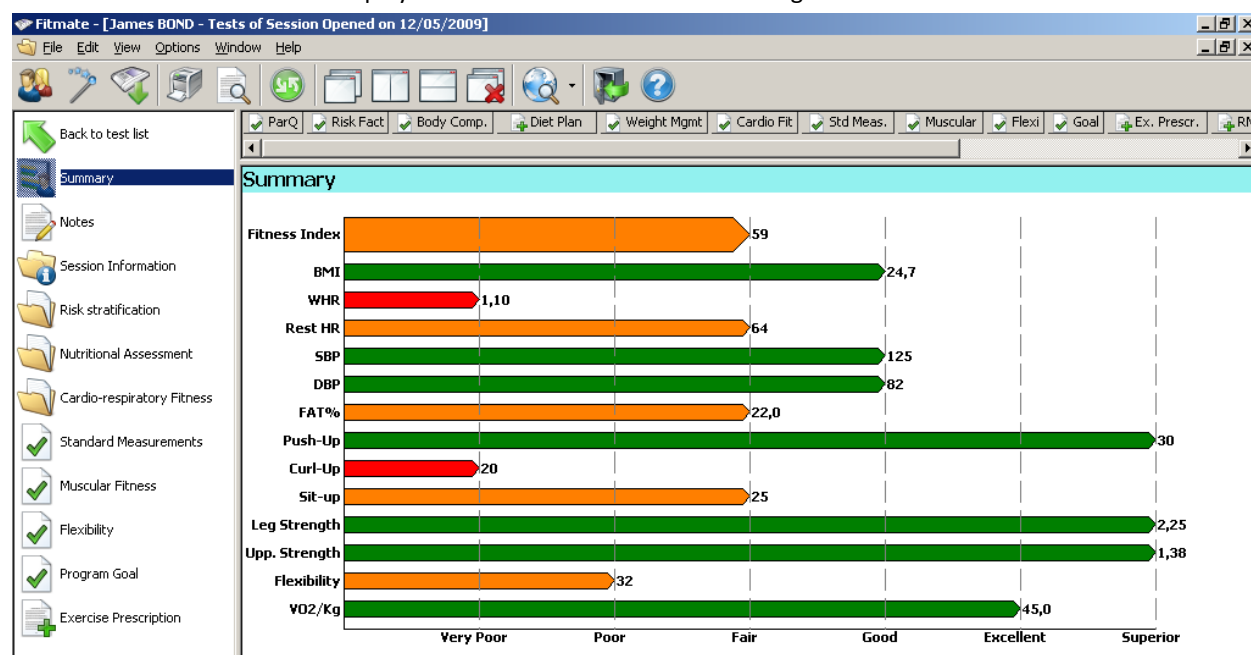
- Height (cm): Input field with value 1,00
- Weight (Kg): Input field with value 0,0
- HR Max (bpm): Input field with value 179
- Test conducted by: Empty text field
- Stage: Dropdown menu with "Initial stage" selected
- Condition: Dropdown menu with "Sedentary" selected
- Buttons: OK, Cancel, and Notes...

► Open an existing testing session



Select a subject and double click on the icon **Opened....** to open an existing testing session.

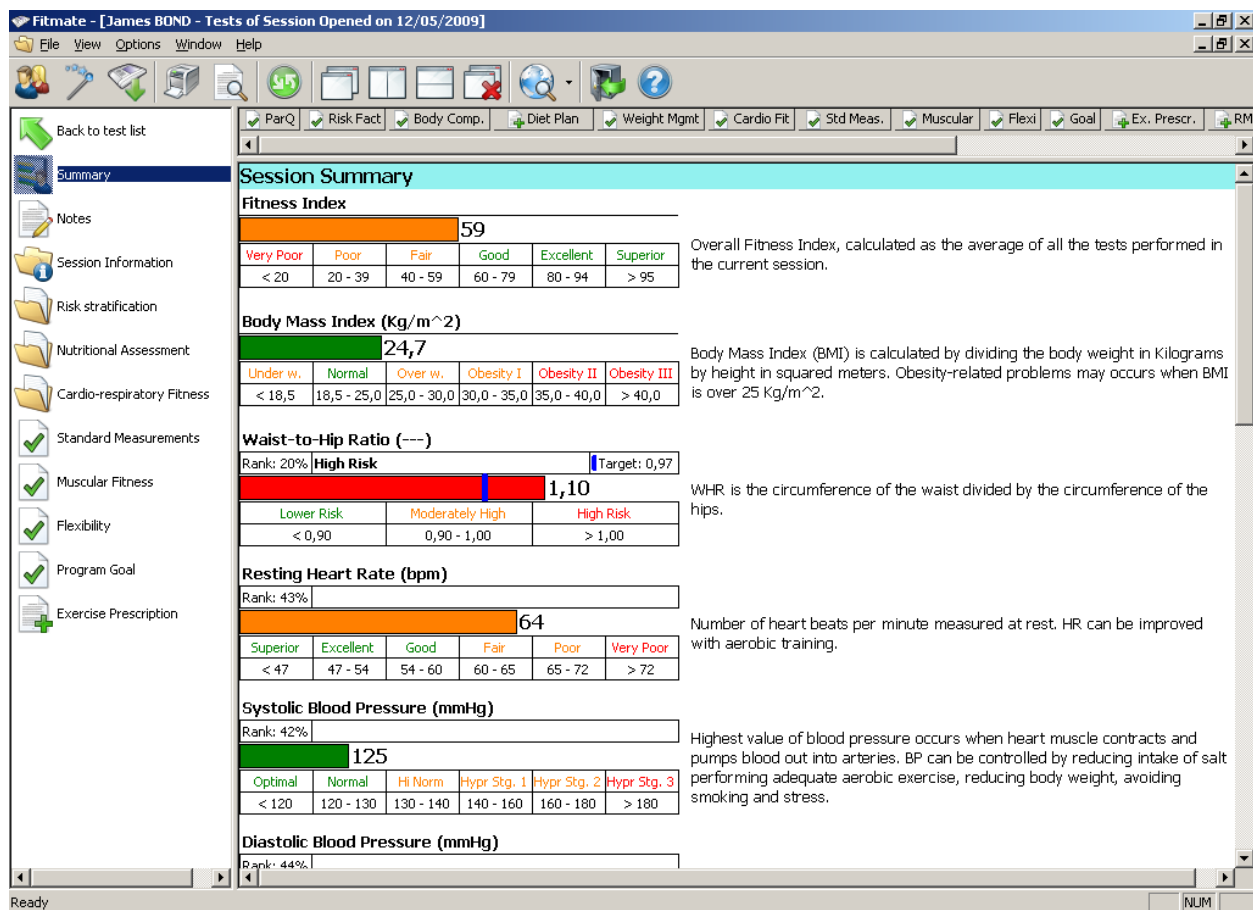
The new window will display all the tests executed in that testing session.



The summary will sum up all the tests performed and the respective value measured, the bars have different colours to better individuate the fitness level.

If a session does not contain any test a blank summary will appear.

The summary can be also displayed in another way, selecting/deselecting **View/alternate summary**.



Description on the right can be hidden by deselecting **View/Gauge text**.

Some icons are displayed in the left part of the window, here below follows their respective meaning:

Icon	Click	Double click
	-	Get back to the previous menu
	Show the summary of session	Modify the information of the session
	Show the notes	Type or modify the notes
	Show the information of the tests performed	Modify the information of the tests performed
	Show a test not yet performed	Execute the test
	Display a test performed	Modify the test data
	Show the test results of the session and the respective goals	Open up the folder containing other test to perform

By right-clicking on the left icons/descriptions, a menu allowing different activities is displayed:

Right click on **Summary**

Print	Prints the session summary
Edit	Edits the session summary
Open in a new window	Opens the summary in a new window
Move to another session	Moves the session to another session
Gauge text	Views the description of each parameter
Alternate summary	Views the summary in an alternate format
Refresh	Refreshes the screen

Right click on **Notes**

Print	Prints the notes
Edit notes	Edits the notes

Open in a new window	Opens the notes in a new window
Refresh	Refreshes the screen
Right click on <i>Session Information</i>	
Edit	Edits the information
Open in a new window	Opens the information in a new window
Refresh	Refreshes the screen
Right click on a test folder	
Open test group	Open up the folder containing the tests
Refresh	Refreshes the screen
Right click on a performed test	
Print	Prints the selected test
Edit	Edits the selected test
Open in a new window	Opens the selected test in a new window
Move to another session	Moves the selected test to another session
Delete	Deletes the selected test from the archive
Gauge text	Views the description of each parameter
Refresh	Refreshes the screen
Right click on a not performed test	
Execute	Performs the selected test
Refresh	Refreshes the screen

Managing test results

To display the test results of a subject select the subject from the list and chose a testing session.

► Show and modify the test results of a session

Use the icons below indicated to display and modify every test data.

Icon	Click	Double click
	-	Get back to the previous menu
	Show the summary of session	Modify the information of the session
	Show the notes	Type or modify the notes
	Show the information of the tests performed	Modify the information of the tests performed
	Show a test not yet performed	Execute the test
	Display a test performed	Modify the test data
	Show the test results of the session and the respective goals	Open up the folder containing other test to perform

► Show a trend



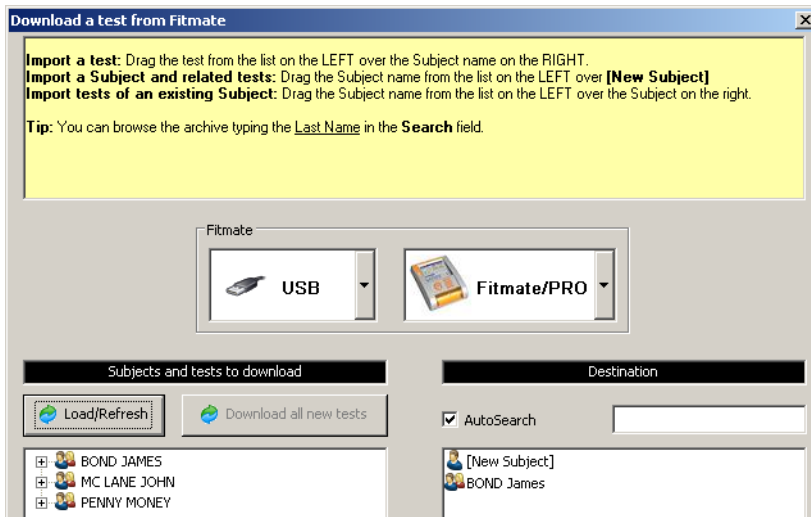
Click the icon **Trend** to display the trend of results for tests performed in different sessions.

Download tests from Fitmate unit



To download data stored in the memory of the Fitmate proceed as follows:

1. Connect the Fitmate to the PC through USB or RS232 link
2. Check if both the unit and the PC SW have been set to operate with the chosen interface (RS232 or USB)
3. Select File/Download Test from Fitmate... or press the corresponding icon on the Toolbar
4. Press the Load/Refresh to activate the communication between Fitmate and PC.
5. The following dialog box will be prompted:



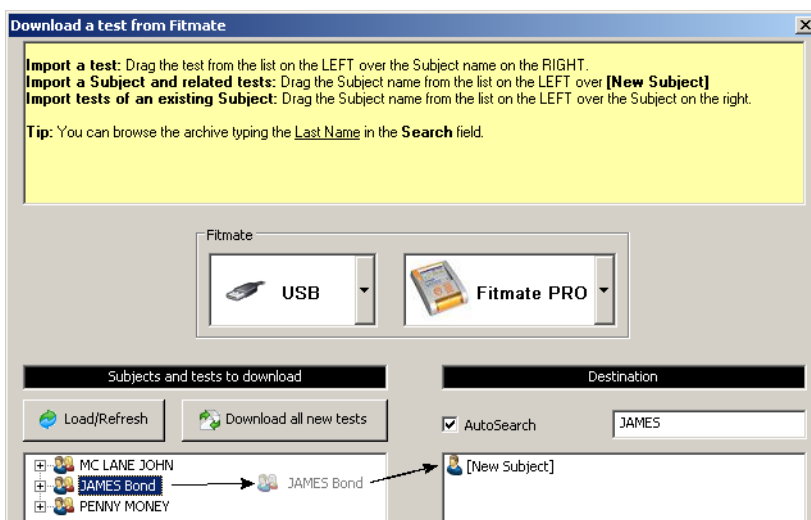
The left side of the dialog box contains the list of subjects stored in the memory of the Fitmate, while the right side the one of the subjects already present in the archive of the PC.

Press the button *Download all new tests* in order to download only the tests not in the PC archive.

Alternatively, it is possible to operate as follows.

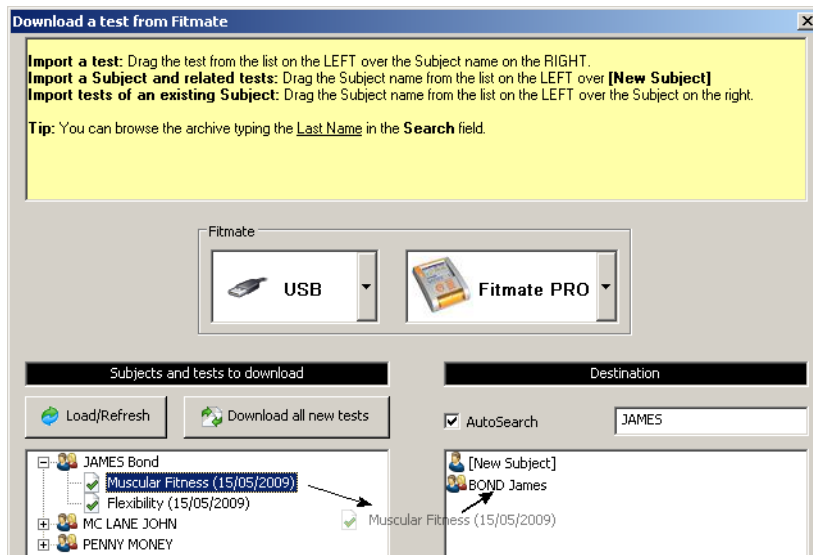
If subject's demographics are not available in the PC archive, it is possible to download automatically both subject's card and test into the PC archive.

To do that, drag the Subject folder from the left side of the window to the **"New Subject"** folder on the right side of the window as shown in the following example:



If Subject's data are already present in the archive of the PC, in order to avoid multiple creations of the same subject, it is possible to drag single tests within the PC archive.

To identify and transfer a single test you may expand the list by double-clicking on the Subject's name on the left side and then drag the desired test into the corresponding subject on the right side of the window, as shown in the following example:



If the archive of the PC already contains in current session another test of the same type and you are trying to overwrite it with a new one coming from the Fitmate, a confirmation dialog box will prompted.

Important Notice: data stored in the Fitmate will remain available until the memory is intentionally initialized with the corresponding function (Utilities/Erase memory).

Test printout

► Printer set up

To set up a printer select **File/Print Setup....** And then select the printer.

► Print preview



To preview a printout report select **File/Print preview** or click on the icon indicated here by side.

Fitmate - [James BOND - Tests of Session Opened on 12/05/2009]

File Edit View Options Window Help

Stampa... Pag. succes. Pag. preced. Due pagine Ingrandisci Riduci Chiudi

Fitmate@ Wellness Technology

Last Name: **BOND** Age: **42** Membership #:
First Name: **James** Height (cm): **180,00** Report Date: **12/05/2009**
Gender: **Male** Weight (Kg): **80,0** Personal Trainer:

Our organization would like to thank you for participating in this fitness evaluation. Specifically, your results are as follows:

Session Summary

Fitness Index

59

Very Poor	Poor	Fair	Good	Excellent	Superior
< 20	20 - 39	40 - 59	60 - 79	80 - 94	> 95

Overall Fitness Index, calculated as the average of all the tests performed in the current session.

Body Mass Index (Kg/m²)

24,7

Under w.	Normal	Over w.	Obesity I	Obesity II	Obesity III
< 18,5	18,5 - 25,0	25,0 - 30,0	30,0 - 35,0	35,0 - 40,0	> 40,0

Body Mass Index (BMI) is calculated by dividing the body weight in Kilograms by height in squared meters. Obesity-related problems may occurs when BMI is over 25 Kg/m².

Waist-to-Hip Ratio (---)

Rank: 20% **High Risk** Target: 0,97

1,10

Lower Risk	Moderately High	High Risk
< 0,90	0,90 - 1,00	> 1,00

WHR is the circumference of the waist divided by the circumference of the hips.

Resting Heart Rate (bpm)

Rank: 43%

64

Superior	Excellent	Good	Fair	Poor	Very Poor
< 47	47 - 54	54 - 60	60 - 65	65 - 72	> 72

Number of heart beats per minute measured at rest. HR can be improved with aerobic training.

Pagina 1 NUM

► Print test results



To printout the test results, a summary or a single report, select **File/print** or click on the icon indicated here by side.

Export/import tests

With Fitmate you can import or export tests, in order to interchange data with other PC.

► Export tests

To export a test, select a test, left-click in the test window and select **File/Export...**

Select the directory and the file name and confirm. The test will be exported in *.xp3 format (Cosmed proprietary).

► Export RMR and Caridiorespiratory Fitness Tests in text format (*.txt)

The steps of RMR and cardiorespiratory fitness tests can also be exported as txt files. Left-click in the test window and select **File/Export steps...** or right-click in the test window and select **Export steps....** Select the directory and the file name and confirm. The test steps will be exported in *.txt format and can be viewed also with a text editor.

► Import tests

To import a test, select **File/Import...**

Select the test to be imported and confirm.

Other software features

► Archive Management

To avoid possible loss of data from the archive we strongly recommend to adequately maintain the archives. Select **File/Archive Management/Reorganize Archive...** periodically.

If for any reason (limited space on the HD) all the data memorized in the archive should be erased then select **File/Archive Management/Erase Archive...**

Reorganizing the archive

1. Select File/Archive Management/Reorganize Archive....
2. Wait till the reorganization is terminated before executing any operation.

Erase the archive

1. Select File/Archive Management/Erase Archive...
2. Wait till the reorganization is terminated before executing any operation.

Backup and restore archive

Warning: Archives must be saved at least once a month, a warning message periodically reminds user to backup the archive, this function avoid that all data memorized are lost if the archives should corrupt or the Fitmate program should damage.

To save the archive, select **File/Archive Management/Backup archive...** and follow the instructions.

To restore the archive select **File/Archive Management/Reorganize Archive...** and follow the instructions.

► Send subject card to the unit

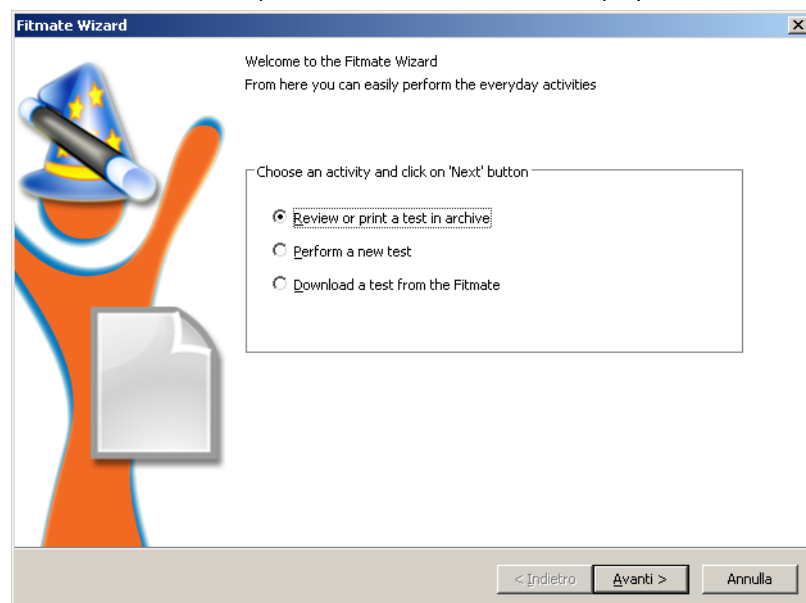
Select **File/Send...** to transfer a subject card from the PC to the Fitmate unit

► Wizard



It is activated by selecting **File/New Activity...** Various pop up windows will guide you step by step to the execution of a new test, the modification or the printout of an existing test, the download to a PC of a test performed on the unit.

Select the desired entry and follow the instructions displayed on video



► Documentation



On-line documentation (for example, the USDA MyPyramid guides) and links to interesting web-sites (for example, Fitmate, USDA, ACSM sites) are available by clicking on this icon in the toolbar.

Performing tests with the PC Software

Subject preliminary assessment

To enter the Section dedicated to the Subject preliminary assessment, double click on the folder **Risk stratification** from an open session menu and then select one of the following tests:

- Par-Q & You
- AHA/ACC CHD Risk (Frammingham cardiovascular disease)
- Duke Treadmill score (Fitmate Med only)
- European CVD Risk (Fitmate Med only)
- BODE Index (Fitmate Med only)

► Par-Q

To perform the Par-Q test, double click on the icon **Par-Q & You**.

The screenshot shows a window titled "Par-Q Questionnaire". At the top, it states: "This questionnaire is mandatory: you cannot execute tests without compile it!". Below this, a note says: "A check symbol on the left of the question means ☒ YES". The main area contains a list of questions, each preceded by a checkbox:

- ☐ Has your doctor ever said you have a heart condition and you should only do physical activity recommended by a doctor?
- ☐ Do you feel pain in your chest when you do physical activity?
- ☐ In the past month, have you had chest pain when you were not doing physical activity?
- ☐ Do you lose your balance because of dizziness or do you lose consciousness?
- ☐ Do you have a bone or joint problem that may be made worse by a change in your physical activity?
- ☐ Is your doctor currently prescribing drugs (for example water pills) for your blood pressure or heart condition?
- ☐ Do you know of any other reason why you should not do physical activity?
- ☐ DO YOU CONFIRM ALL THE ABOVE QUESTIONS?

At the bottom of the window are "OK" and "Cancel" buttons.

Answer precisely to every questions, thick the check box to answer yes, leave it as it is to answer no.

Click **OK** to confirm or **Cancel** to exit

The Par-Q assessment will be displayed on the screen.

The screenshot shows the Fitmate software interface. The title bar reads "Fitmate - [James BOND - Risk stratification of Session Opened on 12/05/2009]". The menu bar includes File, Edit, View, Options, Window, and Help. The toolbar contains various icons for different assessment modules. On the left, a sidebar shows a tree view with "Back to test list", "Risks Summary", "Par-Q & You" (selected), and "AHA/ACC CHD Risk". The main window displays the "Par-Q & You" assessment results. It lists the same questions as the questionnaire, each with a result icon and text:

- ☒ No Has your doctor ever said you have a heart condition and you should only do physical activity recommended by a doctor?
- ☒ No Do you feel pain in your chest when you do physical activity?
- ☒ No In the past month, have you had chest pain when you were not doing physical activity?
- ☒ No Do you lose your balance because of dizziness or do you lose consciousness?
- ☒ No Do you have a bone or joint problem that may be made worse by a change in your physical activity?
- ☒ No Is your doctor currently prescribing drugs (for example water pills) for your blood pressure or heart condition?
- ☒ No Do you know of any other reason why you should not do physical activity?
- ☒ Yes DO YOU CONFIRM ALL THE ABOVE QUESTIONS?

► AHA/ACC CHD Risk

To perform the AHA/ACC CHD Risk test, double click on the icon **AHA/ACC CHD Risk**.

Enter the requested data and press **OK** to confirm or **Cancel** to cancel.

AHA/ACC CHD Risk Questionnaire

HDL Cholesterol (mg/dl)

Total Cholesterol (mg/dl)

Systolic Blood Pressure (mmHg)

Have you been diagnosed with diabetes?

Smoking

Major CAD Symptoms: (*)

Family History of Heart attack (*)

(*) Used for Exercise Prescription only

The test report will appear on the screen.

Fitmate - [James BOND - Risk stratification of Session Opened on 12/05/2009]

File Edit View Options Window Help

Back to test list Risks Summary Par-Q & You AHA/ACC CHD Risk

AHA/ACC CHD Risk

HDL Cholesterol (mg/dl) 50,00
 Total Cholesterol (mg/dl) 190,00
 Systolic Blood Pressure (mmHg) 120
 Have you been diagnosed with diabetes? No
 Smoking No
 Family History of Heart attack No cardiovascular diseases
 Major CAD Symptoms: No symptoms
 Absolute Risk 3%

Risk Factor (---)

1,0

Below average risk	Average risk	Moder. above aver. risk	High risk
< 2,2	2,3 - 2,5	2,6 - 4,2	> 4,2

► Duke Treadmill score (Fitmate Med only)

To perform the Duke Treadmill score test, double click on the icon **Duke Treadmill score**.

Enter the requested data and press **OK** to confirm or **Cancel** to cancel.

Duke Treadmill Score

Functional Capacity (METs)

ST-Segment Deviation (mm):

Angina during exercise:

The test report will appear on the screen.

Fitmate - [James BOND - Risk stratification of Session Opened on 12/05/2009]

File Edit View Options Window Help

Back to test list Risks Summary Par-Q & You AHA/ACC CHD Risk Duke Treadmill Score European CVD Risk BODE Index

Duke Treadmill Score

Functional Capacity (METs) 8,0
 ST-Segment Deviation (mm): 0
 Angina during exercise: None

Duke Treadmill Score (---)

9

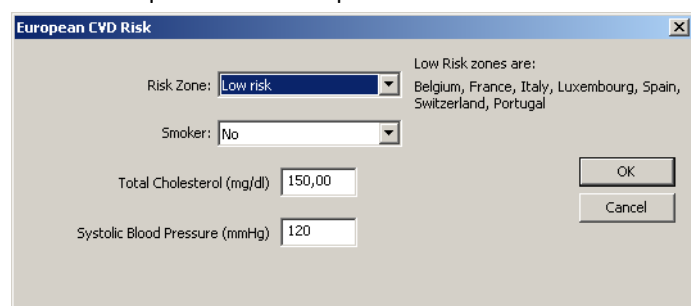
High risk	Moderate Risk	Low risk
< -10	-10 - 4	> 4

The food group code is already in use.
Please assign a UNIQUE code to the new group.

► European CVD Risk (Fitmate Med only)

To perform the European CVD Risk test, double click on the icon **European CVD Risk**.

Enter the requested data and press **OK** to confirm or **Cancel** to cancel.

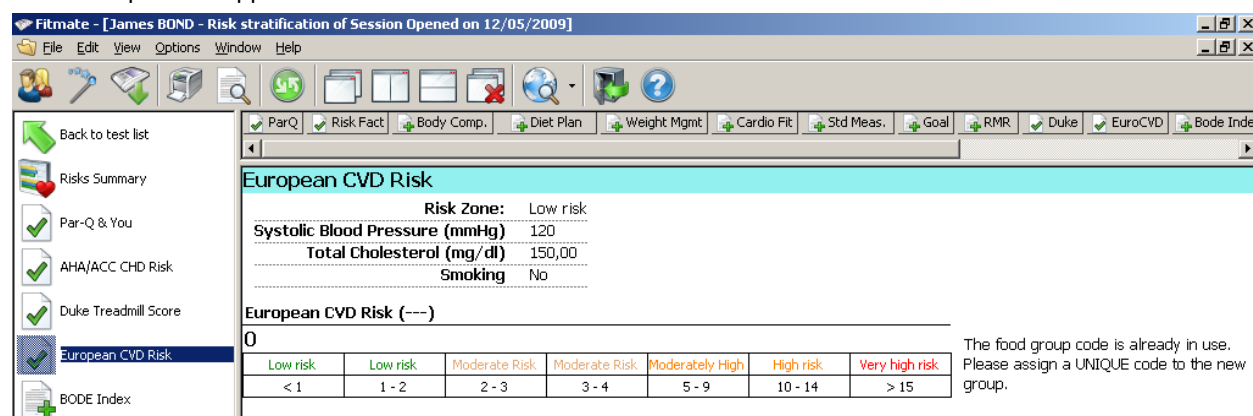


European CVD Risk dialog box. It contains the following fields and options:

- Risk Zone: Low risk (dropdown menu)
- Smoker: No (dropdown menu)
- Total Cholesterol (mg/dl): 150,00 (text input)
- Systolic Blood Pressure (mmHg): 120 (text input)
- Buttons: OK, Cancel
- Text: Low Risk zones are: Belgium, France, Italy, Luxembourg, Spain, Switzerland, Portugal

Risk Zone: Low risk for Belgium, France, Italy, Luxembourg, Spain, Switzerland and Portugal. High risk for the other Countries.

The test report will appear on the screen.



Fitmate - [James BOND - Risk stratification of Session Opened on 12/05/2009]

European CVD Risk

Risk Zone: Low risk

Systolic Blood Pressure (mmHg) 120

Total Cholesterol (mg/dl) 150,00

Smoking No

European CVD Risk (---)

0

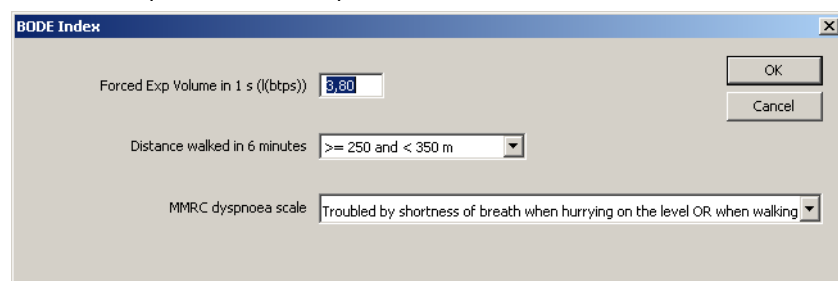
Low risk	Low risk	Moderate Risk	Moderate Risk	Moderately High	High risk	Very high risk
< 1	1 - 2	2 - 3	3 - 4	5 - 9	10 - 14	> 15

The food group code is already in use. Please assign a UNIQUE code to the new group.

► BODE Index (Fitmate Med only)

To perform the BODE Index test, double click on the icon **BODE Index**.

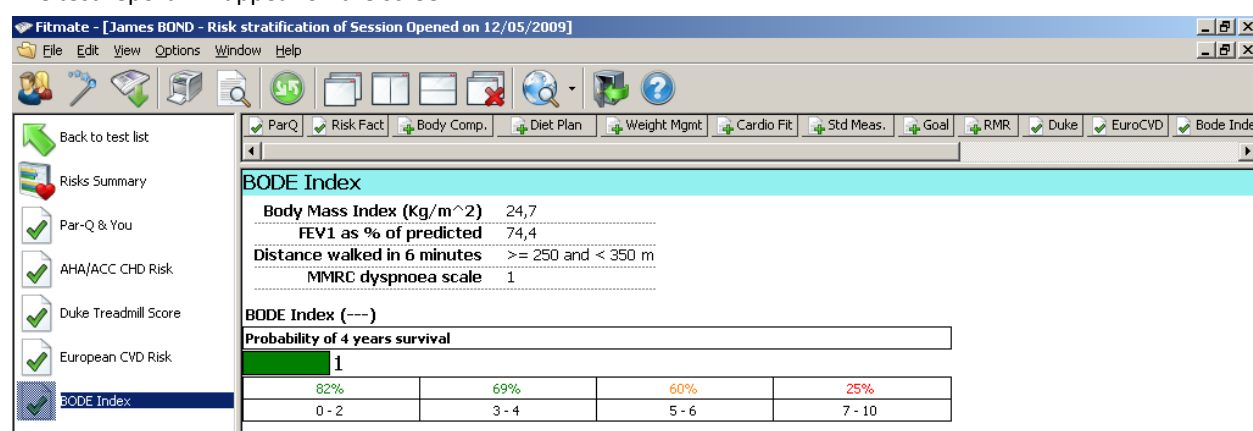
Enter the requested data and press **OK** to confirm or **X** to cancel.



BODE Index dialog box. It contains the following fields and options:

- Forced Exp Volume in 1 s (l(btps)): 3,80 (text input)
- Distance walked in 6 minutes: >= 250 and < 350 m (dropdown menu)
- MMRC dyspnoea scale: Troubled by shortness of breath when hurrying on the level OR when walking (dropdown menu)
- Buttons: OK, Cancel

The test report will appear on the screen.



Fitmate - [James BOND - Risk stratification of Session Opened on 12/05/2009]

BODE Index

Body Mass Index (Kg/m²) 24,7

FEV1 as % of predicted 74,4

Distance walked in 6 minutes >= 250 and < 350 m

MMRC dyspnoea scale 1

BODE Index (---)

Probability of 4 years survival

1

82%	69%	60%	25%
0 - 2	3 - 4	5 - 6	7 - 10

► Risks Summary



To review the Risks Summary, click on the icon **Risks Summary**.

A summary of the information entered during the Risk Analysis phase is shown, as well as the tests results.

Fitmate - [James BOND - Risk stratification of Session Opened on 12/05/2009]

File Edit View Options Window Help

ParQ Risk Fact Body Comp Diet Plan Weight Mgmt Cardio Fit Std Meas Goal RMR Duke EuroCVD Bode Inde

Back to test list

Risks Summary

Par-Q & You

✓ AHA/ACC CHD Risk

✓ Duke Treadmill Score

✓ European CVD Risk

✓ BODE Index

AHA/ACC CHD Risk

HDL Cholesterol (mg/dl) 50,00
 Total Cholesterol (mg/dl) 190,00
 Systolic Blood Pressure (mmHg) 120
 Have you been diagnosed with diabetes? No
 Smoking No
 Family History of Heart attack No cardiovascular diseases
 Major CAD Symptoms: No symptoms
 Absolute Risk 3%

Risk Factor (---)

1,0

Below average risk	Average risk	Moder. above aver. risk	High risk
< 2,2	2,3 - 2,5	2,6 - 4,2	> 4,2

Duke Treadmill Score

Functional Capacity (METs) 4,0
 ST-Segment Deviation (mm): 1
 Angina during exercise: None

Duke Treadmill Score (---)

-1

High risk	Moderate Risk	Low risk
< -10	-10 - 4	> 4

The food group code is already in use.
Please assign a UNIQUE code to the new group.

European CVD Risk

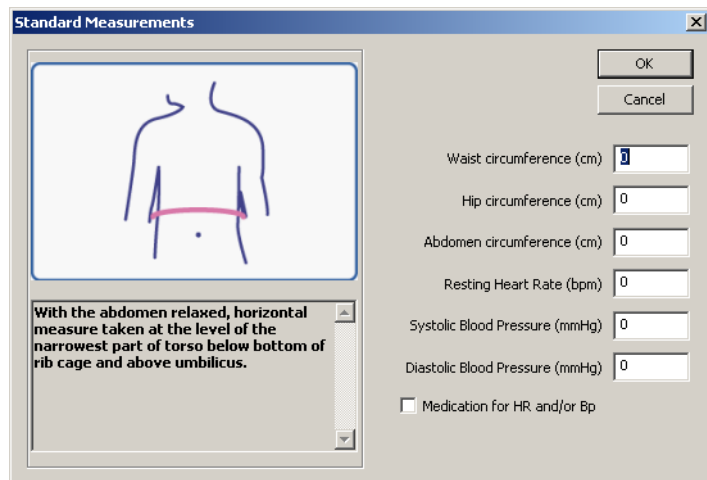
Risk Zone: Low risk
 Systolic Blood Pressure (mmHg) 120
 Total Cholesterol (mg/dl) 150,00
 Smoking No

European CVD Risk (---)

Ready NUM

Standard measurements

To execute the standard measurement test, double click on the icon **Standard Measurements** from an open session menu



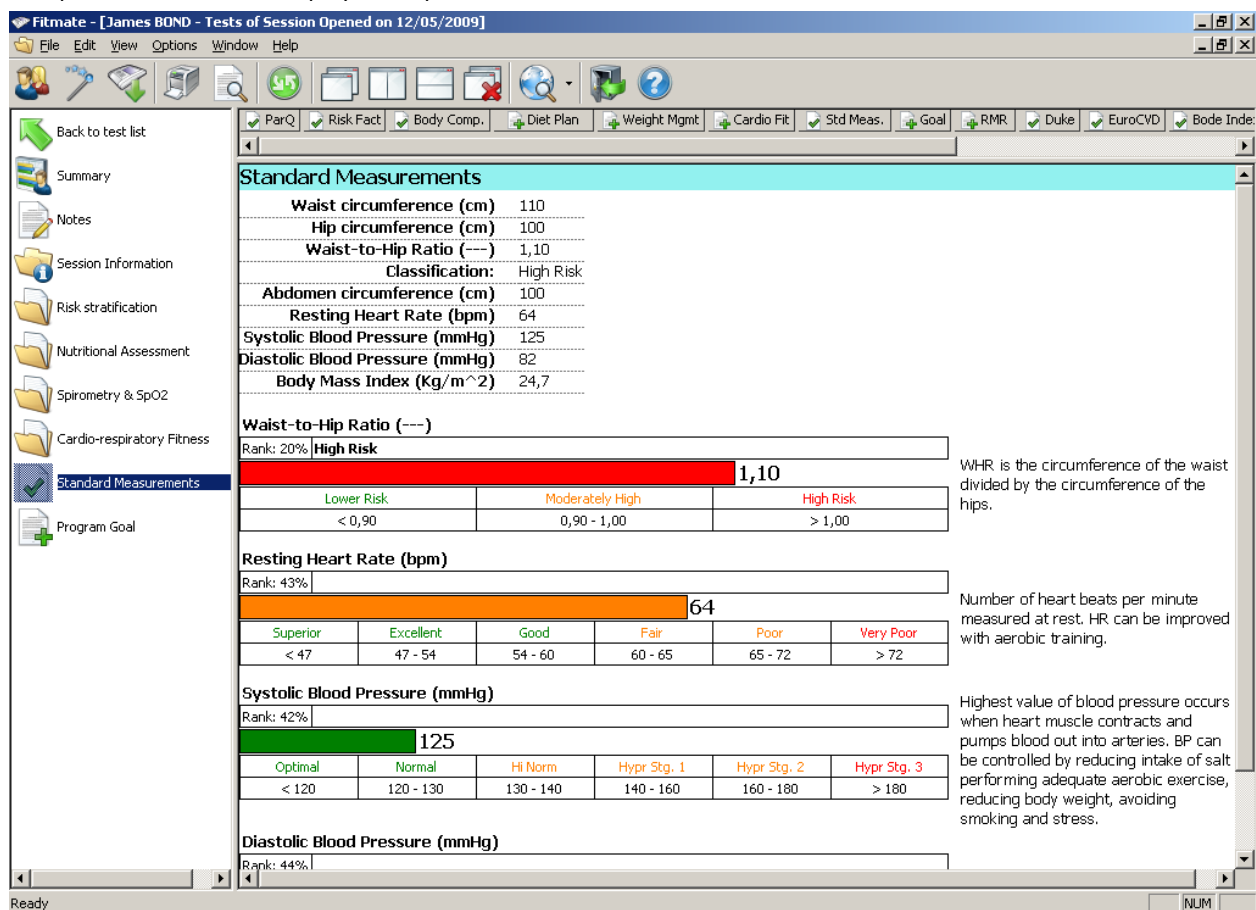
The dialog box titled "Standard Measurements" contains a diagram of a human torso with a pink line indicating the measurement level at the narrowest part of the torso, below the rib cage and above the umbilicus. Below the diagram, a text box states: "With the abdomen relaxed, horizontal measure taken at the level of the narrowest part of torso below bottom of rib cage and above umbilicus." To the right of the diagram are input fields for: Waist circumference (cm), Hip circumference (cm), Abdomen circumference (cm), Resting Heart Rate (bpm), Systolic Blood Pressure (mmHg), and Diastolic Blood Pressure (mmHg). All fields currently show "0". There is also a checkbox for "Medication for HR and/or Bp" which is unchecked. At the top right are "OK" and "Cancel" buttons.

Enter the necessary information in the blanks. To execute a correct measurement follow the indications displayed on the screen.

If a zero is entered in a field, this value won't be showed neither in the test results nor in the printout.

Click **OK** to confirm.

An updated window will display the report of the information entered.



The screenshot shows the "Fitmate - [James BOND - Tests of Session Opened on 12/05/2009]" window. The "Standard Measurements" section is highlighted in the left sidebar. The main window displays a report for the "Standard Measurements" test. The report includes a table of measurements and a summary of results.

Measurement	Value
Waist circumference (cm)	110
Hip circumference (cm)	100
Waist-to-Hip Ratio (---)	1,10
Classification:	High Risk
Abdomen circumference (cm)	100
Resting Heart Rate (bpm)	64
Systolic Blood Pressure (mmHg)	125
Diastolic Blood Pressure (mmHg)	82
Body Mass Index (Kg/m ²)	24,7

Waist-to-Hip Ratio (---)
Rank: 20% **High Risk**

Lower Risk	Moderately High	High Risk
< 0,90	0,90 - 1,00	> 1,00

Resting Heart Rate (bpm)
Rank: 43%

Superior	Excellent	Good	Fair	Poor	Very Poor
< 47	47 - 54	54 - 60	60 - 65	65 - 72	> 72

Systolic Blood Pressure (mmHg)
Rank: 42%

Optimal	Normal	Hi Norm	Hypr Stg. 1	Hypr Stg. 2	Hypr Stg. 3
< 120	120 - 130	130 - 140	140 - 160	160 - 180	> 180

Diastolic Blood Pressure (mmHg)
Rank: 44%

WHR is the circumference of the waist divided by the circumference of the hips.

Number of heart beats per minute measured at rest. HR can be improved with aerobic training.

Highest value of blood pressure occurs when heart muscle contracts and pumps blood out into arteries. BP can be controlled by reducing intake of salt performing adequate aerobic exercise, reducing body weight, avoiding smoking and stress.

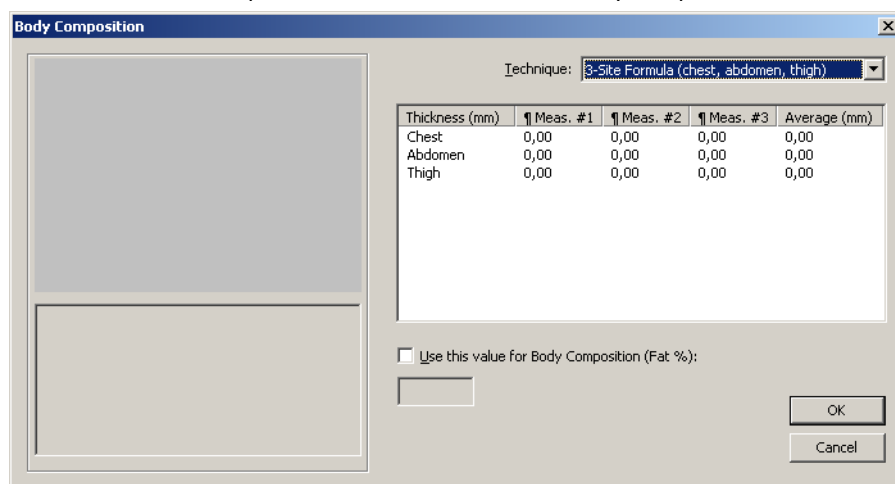
Nutritional assessment

To enter the nutritional assessment click on *Nutritional assessment* from an open session menu and then select one of the following options:

- Energy balance
- Weekly Diet Planner
- Body composition
- Resting Metabolic Rate
- Activity Monitor

► Body composition

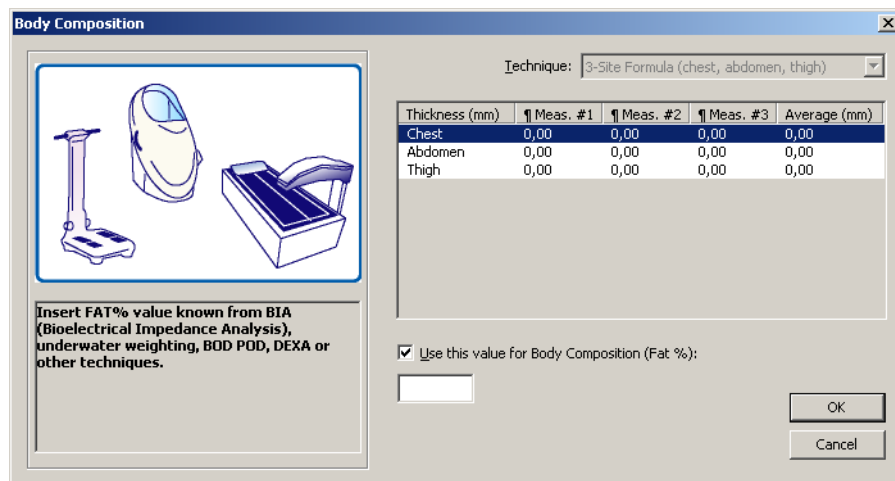
Double click on correspondent icon to calculate the body composition.



Thickness (mm)	¶ Meas. #1	¶ Meas. #2	¶ Meas. #3	Average (mm)
Chest	0,00	0,00	0,00	0,00
Abdomen	0,00	0,00	0,00	0,00
Thigh	0,00	0,00	0,00	0,00

Case A: the percentage of FAT is known

Click on the box **Use this value for Body Composition (Fat%)** and enter the values in the corresponding field. Press **OK** to confirm.



Thickness (mm)	¶ Meas. #1	¶ Meas. #2	¶ Meas. #3	Average (mm)
Chest	0,00	0,00	0,00	0,00
Abdomen	0,00	0,00	0,00	0,00
Thigh	0,00	0,00	0,00	0,00

Case B: The percentage of Fat is unknown and it is required its measurement

Chose the measuring method (3-sites or 7-sites) and then enter the measured values in their respective fields. Double click on the field to have access. For a better execution of the measurement follow the instructions displayed on the screen and illustrated by the picture on the left side.

Body Composition

Technique: 3-Site Formula (chest, abdomen, thigh)

Thickness (mm)	Meas. #1	Meas. #2	Meas. #3	Average (mm)
Chest	3,00	0,00	0,00	0,00
Abdomen	0,00	0,00	0,00	0,00
Thigh	0,00	0,00	0,00	0,00

Diagonal fold; one-half the distance between the anterior axillary line and the nipple (men) or one third of the distance between the anterior axillary line and the nipple (women).

☐ Use this value for Body Composition (Fat %):

OK Cancel

Click **OK** to confirm.

Note: The average is calculated discarding the farthest measurement

Test results display

Both in case A and B all the information will lay on a report once they are confirmed.

Fitmate - [James BOND - Weight Management Tests of Session Opened on 12/05/2009]

File Edit View Options Window Help

Back to test list

Body Composition

Weekly Diet Planner

Energy Balance

Resting Metabolic Rate

Activity Monitor

ParQ Risk Fact Body Comp. Diet Plan Weight Mgmt Cardio Fit Std Meas. Goal RMR Duke EuroCVD Bode Inde

Body Composition

FAT% (%) 22,0

Classification statement Acceptable range (higher end)

FBM (Kg) 17,6

LBM (Kg) 62,4

Body Composition (FAT%) (%)

Rank: 43%

22,0

Fat% is the percentage of fat over the whole body mass.

Superior	Excellent	Good	Fair	Poor	Very Poor
< 12,3	12,3 - 16,3	16,3 - 19,6	19,6 - 22,5	22,5 - 26,1	> 26,1

Resting metabolic rate

The RMR test must be performed with the Fitmate or another Cosmed device and then imported in the PC software archive.

Refer to chapter *Operating with Fitmate* for the set-up and the test execution.

Double click on the icon **Resting metabolic rate** from an open session menu.

RMR Test

Import a test from an XPO file

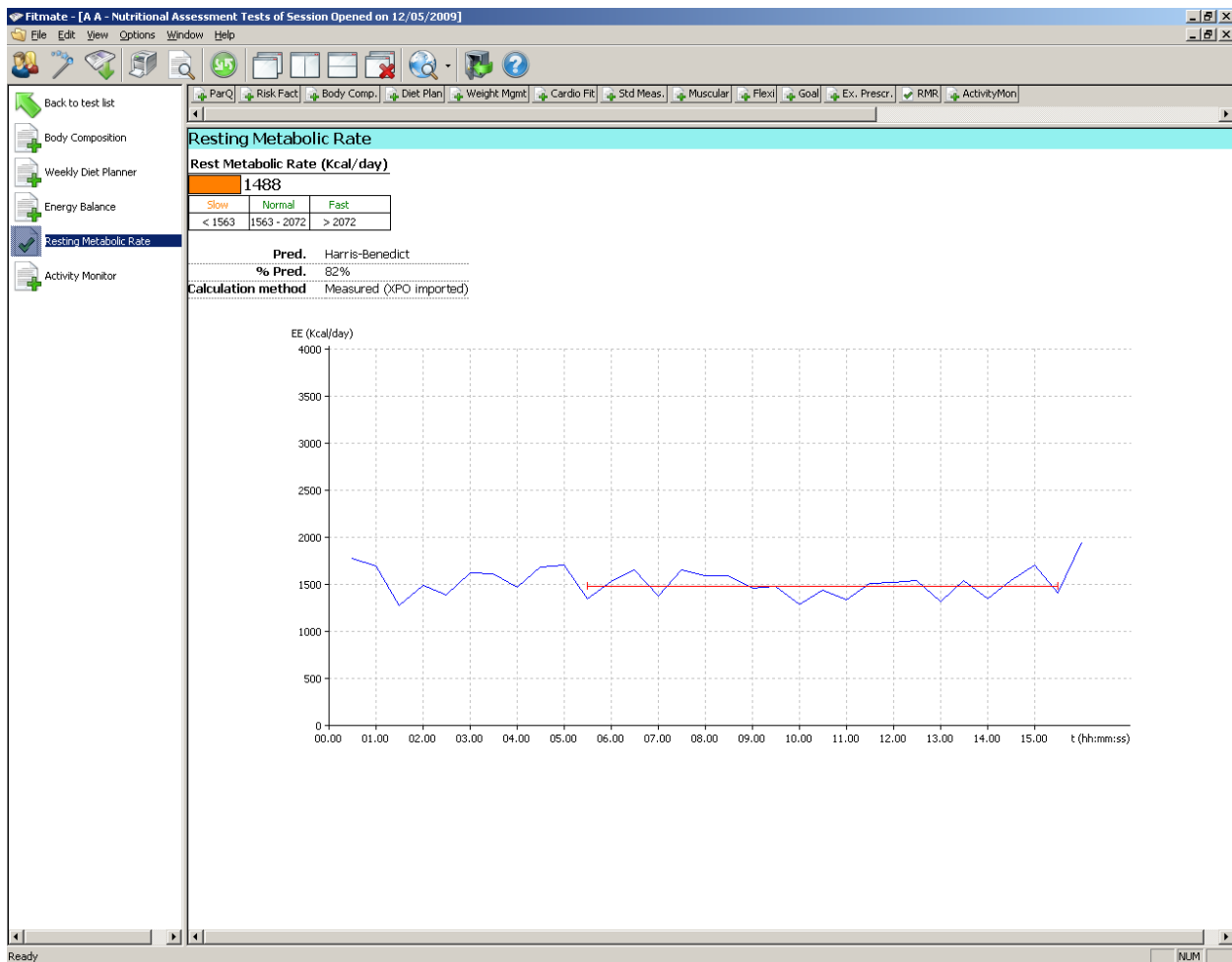
Cancel

If the test is already saved in *.xpo format, press **Import a test from an XPO file**, select the file to be imported and confirm.

Note: The test must be exported with 9.1 CPET software version or higher.

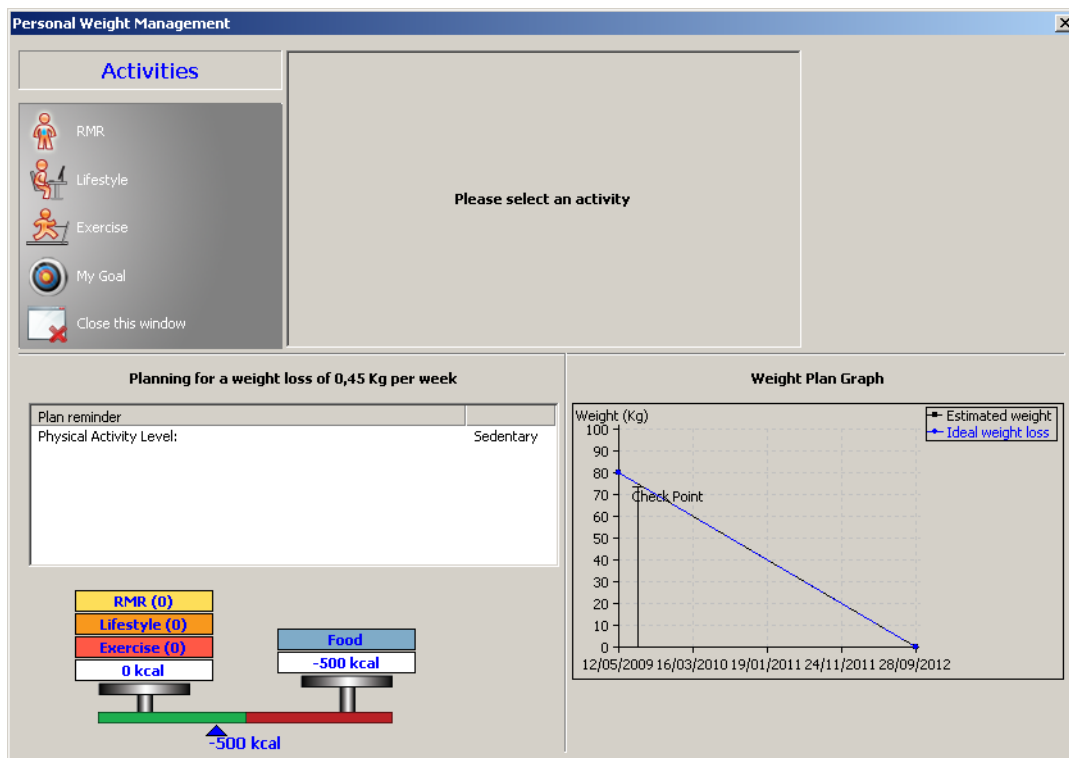
If the test was performed on the Fitmate, download the test into the PC archive (see the section *Download the test from Fitmate unit*).

An overall RMR assessment will be displayed on the screen.



► Energy balance

To perform a RMR test and elaborate an energy balance, double click on the icon **Energy balance**.



RMR



Click on the **RMR** icon to fill in the information of the RMR test.

Personal Weight Management

Activities

- RMR
- Lifestyle
- Exercise
- My Goal
- Close this window

RMR

☐ Use this value for RMR (kcal/day):

0 Harris-Benedict Predicted Value

OK
Cancel

Planning for a weight loss of 0,45 Kg per week

Plan reminder

Physical Activity Level: Sedentary

RMR (0)
Lifestyle (0)
Exercise (0)
0 kcal

Food
-500 kcal

-500 kcal

Weight Plan Graph

Weight (Kg)

100
90
80
70
60
50
40
30
20
10
0

12/05/2009 16/03/2010 19/01/2011 24/11/2011 28/09/2012

Estimated weight
Ideal weight loss

Check Point

The RMR value can be entered manually or calculated starting from the Harris-Benedict formula. Click **OK** to confirm. The windows will update considering the information entered.

Lifestyle



Click **Lifestyle** to enter the information about the activities performed during the day. Complete the information required and click **OK** to confirm.

User can:

1. Set the type of physical activity performed during the day (Forced Rest, Sedentary, Normal, Very Active).

Personal Weight Management

Activities

- RMR
- Lifestyle
- Exercise
- My Goal
- Close this window

My Lifestyle (do not include planned exercise sessions!)

Std Classification User def'd Activity Monitor Pedometer

Physical Activity Level: Sedentary

OK
Cancel

Information

Seated work with no option of moving around and little or no strenuous daily physical activity

Planning for a weight loss of 0,45 Kg per week

Plan reminder

Physical Activity Level: Sedentary

RMR (1750)
Lifestyle (525)
Exercise (0)
2275 kcal

Food
1775 kcal

-500 kcal

Weight Plan Graph

Weight (Kg)

100
90
80
70
60
50
40
30
20
10
0

12/05/2009 16/03/2010 19/01/2011 24/11/2011 28/09/2012

Estimated weight
Ideal weight loss

Check Point

2. Define the amount of hours are spent for specific activities.

Personal Weight Management

Activities

- RMR
- Lifestyle
- Exercise
- My Goal
- Close this window

My Lifestyle (do not include planned exercise sessions!)

Std Classification | User def'd | **Activity Monitor** | Pedometer

Rest (hours per day): 5

Very light (hours per day): 14

Light (hours per day): 2

Moderate (hours per day): 0

Heavy (hours per day): 0

0 hours left

OK

Cancel

Information

Sleeping, reclining...

Planning for a weight loss of 0,45 Kg per week

Plan reminder

Physical Activity Level: Sedentary

RMR (1750)

Lifestyle (525)

Exercise (0)

2275 kcal

Food

1775 kcal

-500 kcal

Weight Plan Graph

Weight (Kg)

100

90

80

70

60

50

40

30

20

10

0

12/05/2009 16/03/2010 19/01/2011 24/11/2011 28/09/2012

Estimated weight

Ideal weight loss

Check Point

3. Enter the amount of extra-calories consumed in a day, exceeding the RMR, and measured with an activity monitor.

Personal Weight Management

Activities

- RMR
- Lifestyle
- Exercise
- My Goal
- Close this window

My Lifestyle (do not include planned exercise sessions!)

Std Classification | User def'd | **Activity Monitor** | Pedometer

AMR (Kcal):

OK

Cancel

Information

Enter here the extra daily calories burnt in a day on top of your RMR measured by means of an activity monitor.

Planning for a weight loss of 0,45 Kg per week

Plan reminder

Physical Activity Level: Sedentary

RMR (1750)

Lifestyle (525)

Exercise (0)

2275 kcal

Food

1775 kcal

-500 kcal

Weight Plan Graph

Weight (Kg)

100

90

80

70

60

50

40

30

20

10

0

12/05/2009 16/03/2010 19/01/2011 24/11/2011 28/09/2012

Estimated weight

Ideal weight loss

Check Point

4. Indicate the steps walked in a day and counted by a step-counter.

Personal Weight Management

Activities

- RMR
- Lifestyle
- Exercise
- My Goal
- Close this window

My Lifestyle (do not include planned exercise sessions!)

Std Classification | User def'd | Activity Monitor | Pedometer

Number of steps per day:

OK | Cancel

Information

Enter here the daily steps count (measured with a pedometer). Together with your body weight, height and age, it will allow an estimation of the number of

Planning for a weight loss of 0,45 Kg per week

Plan reminder

Physical Activity Level: Sedentary

RMR (1750)
Lifestyle (525)
Exercise (0)
2275 kcal

Food
1775 kcal

-500 kcal

Weight Plan Graph

Weight (Kg)

100
90
80
70
60
50
40
30
20
10
0

12/05/2009 16/03/2010 19/01/2011 24/11/2011 28/09/2012

Estimated weight
Ideal weight loss

Check Point

The windows will update with the latest information entered.

Exercise



Click on **Exercise** to complete the information about the exercise performed in a week.

Personal Weight Management

Activities

- RMR
- Lifestyle
- Exercise
- My Goal
- Close this window

Exercise

Sessions per week: OK | Cancel

Duration (minutes):

Activity: Walking

Speed kmh

Incline (%)

☐ Use this value for Exercise (kcal):

Information

Text to be defined

Planning for a weight loss of 0,45 Kg per week

Plan reminder

14 hours a day of Very light activity 21
2 hours a day of Light activity 5

RMR (1750)
Lifestyle (350)
Exercise (0)
2100 kcal

Food
1600 kcal

-500 kcal

Weight Plan Graph

Weight (Kg)

100
90
80
70
60
50
40
30
20
10
0

12/05/2009 16/03/2010 19/01/2011 24/11/2011 28/09/2012

Estimated weight
Ideal weight loss

Check Point

Complete the information required (see table). Press **OK** to confirm or **X** to cancel. Alternatively, if known, it is possible to enter directly the energy expenditure induced by exercise.

Exercise	Required information
Walking	Sessions, duration, speed, grade
Running	Sessions, duration, speed, grade
Leg cycling	Sessions, duration, watt
Arm cycling	Sessions, duration, watt

Stepping	Sessions, duration, rate, step height
Other	Sessions, calories

If more than one exercise is performed, or it is performed an exercise not included in the above list, it is possible to indicate *other* and its caloric cost.

The windows will update with the latest information entered.

Goals



Click on **My Goal** to define the goal to reach.

Personal Weight Management

Activities

- RMR
- Lifestyle
- Exercise
- My Goal**
- Close this window

Goal

Kg per week: 0,5

Desired Body Weight: 70,5 BMI Target...

Next check: 4 weeks

Actual

Height (cm) 180,00

Weight (Kg) 80,0

BMI (Kg/m²) 24,7

OK

Default

Cancel

Planning for a weight loss of 0,50 Kg per week

Plan reminder

14 hours a day of Very light activity	21
2 hours a day of Light activity	5
3 sess. per week of 45 min each of Walking at Speed=6,00 kmh an...	104

Weight Plan Graph

Weight (Kg)

22/05/2009 27/06/2009 03/08/2009 09/09/2009 16/10/2009

Estimated weight

Ideal weight loss

check point

RMR (1750)

Lifestyle (730)

Exercise (104)

2584 kcal

Food

2032 kcal

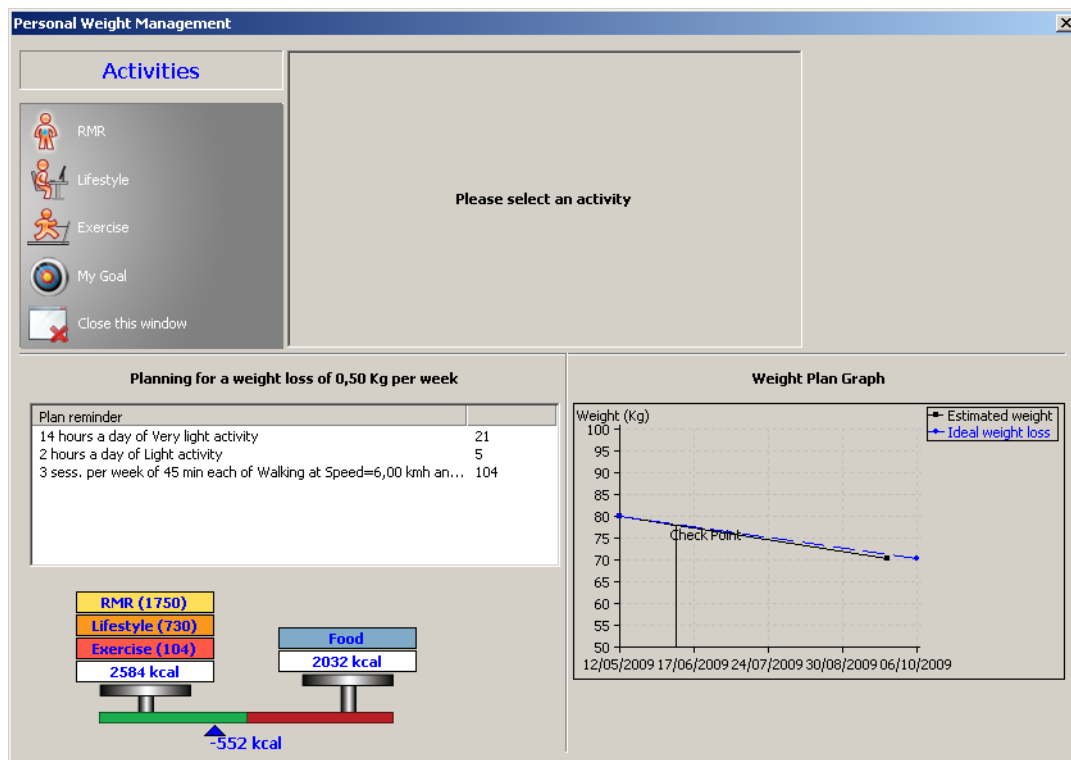
-552 kcal

Type the goals in the blanks:

- Weekly weight loss (recommended within the range 0.5-1 Kg)
- Desired weight (as alternative it is possible to enter the desired BMI)
- Time interval for the next check

Click **OK** to confirm.

The windows will update with the latest information entered.



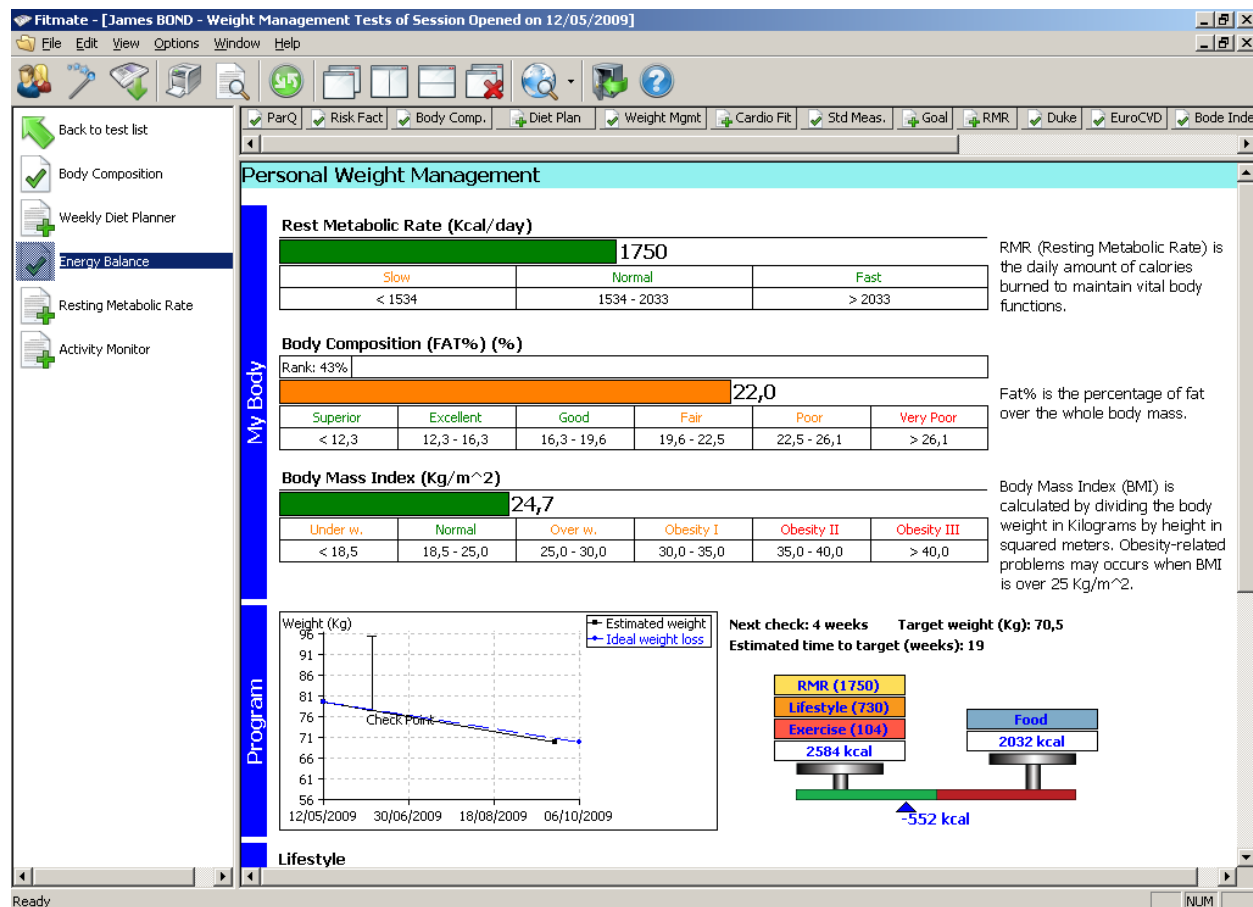
The graph on the right side shows the ideal body change (in blue), with a weight loss of 1 pound (454 g) per week, and the desired body change (in black), following the indications entered above.

If you desire a positive weight variation, set a desired weight greater than the actual.

Visualization of the results

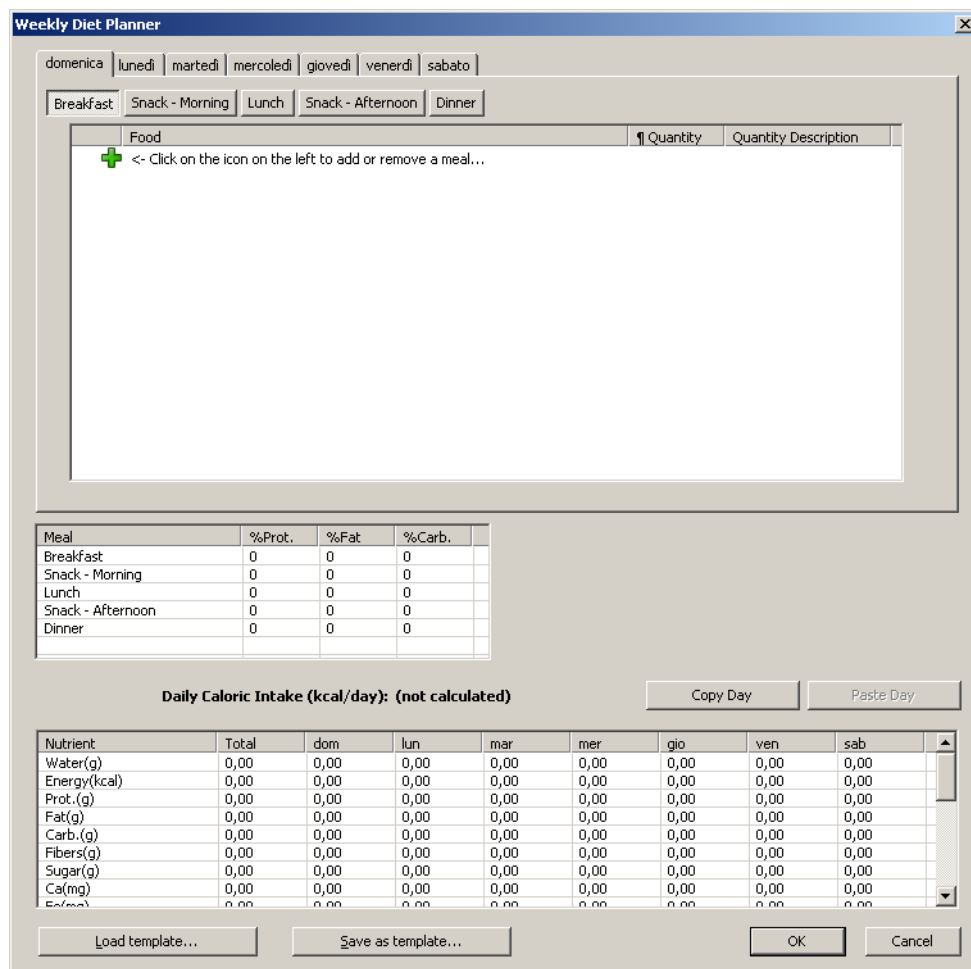


Closing the window **Personal weight management**, the personalized program will display on the screen with the updated information.



► Weekly diet planner

To calculate exactly the daily caloric intake click on the correspondent icon and fill in all the necessary information in the dialog that appears.



The 'Weekly Diet Planner' dialog box features a tabbed interface for days of the week (domenica, lunedì, martedì, mercoledì, giovedì, venerdì, sabato) and meal types (Breakfast, Snack - Morning, Lunch, Snack - Afternoon, Dinner). A large text area for food entry includes a green plus icon and a prompt: '<- Click on the icon on the left to add or remove a meal...'. Below this is a table for meal statistics:

Meal	%Prot.	%Fat	%Carb.
Breakfast	0	0	0
Snack - Morning	0	0	0
Lunch	0	0	0
Snack - Afternoon	0	0	0
Dinner	0	0	0

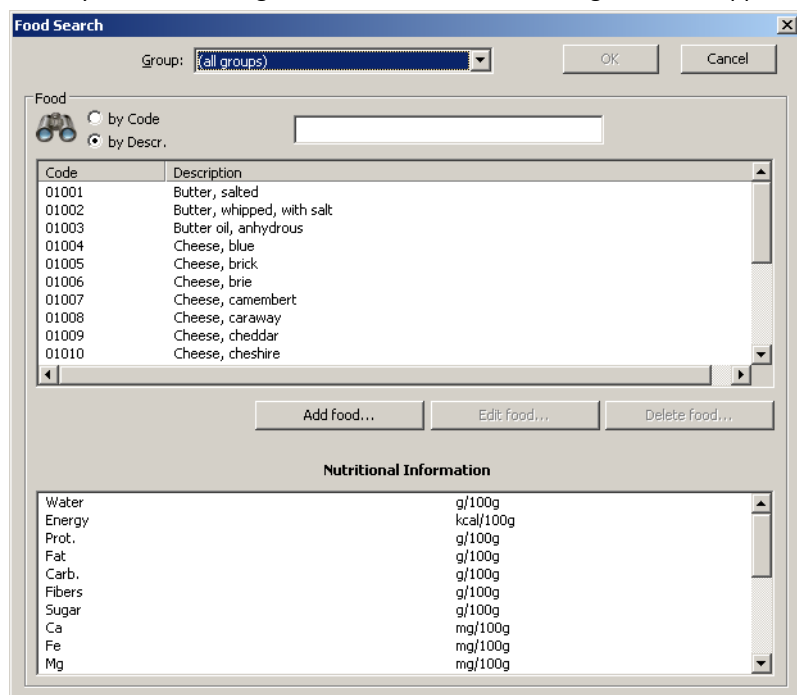
Below the table, the 'Daily Caloric Intake (kcal/day): (not calculated)' is shown, with 'Copy Day' and 'Paste Day' buttons. A detailed nutrient table follows:

Nutrient	Total	dom	lun	mar	mer	gio	ven	sab
Water(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Energy(kcal)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Prot.(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fat(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Carb.(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fibers(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Sugar(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Ca(mg)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fe(mg)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

At the bottom are buttons for 'Load template...', 'Save as template...', 'OK', and 'Cancel'.

Select for each day, and for each meal, the foods and their quantities, by clicking on the green arrow in the top box.

When you click on the green arrow, a window showing the foods appears.



The 'Food Search' dialog box allows searching by group (all groups), code, or description. It displays a list of food items with their codes and descriptions:

Code	Description
01001	Butter, salted
01002	Butter, whipped, with salt
01003	Butter oil, anhydrous
01004	Cheese, blue
01005	Cheese, brick
01006	Cheese, brie
01007	Cheese, camembert
01008	Cheese, caraway
01009	Cheese, cheddar
01010	Cheese, cheshire

Buttons for 'Add Food...', 'Edit Food...', and 'Delete Food...' are provided. Below is a 'Nutritional Information' table:

Nutrient	Unit
Water	g/100g
Energy	kcal/100g
Prot.	g/100g
Fat	g/100g
Carb.	g/100g
Fibers	g/100g
Sugar	g/100g
Ca	mg/100g
Fe	mg/100g
Mg	mg/100g

In order to find the foods more easily, it is possible to select the food group or search it by code or description (also part of the name).

When a food is selected, its nutrition facts appear in the lower part of the window. Press **OK** or double click on the selected food to enter it in the list for the current meal.

Weekly Diet Planner

domenica | lunedì | martedì | mercoledì | giovedì | venerdì | sabato

Breakfast | **Snack - Morning** | Lunch | Snack - Afternoon | Dinner

Food	Quantity	Quantity Description
✗ Oranges, raw, navels	0,00	1 cup, sections witho...
+ <- Click on the icon on the left to add or remove a meal...		

Meal	%Prot.	%Fat	%Carb.
Breakfast	0	0	0
Snack - Morning	0	0	0
Lunch	0	0	0
Snack - Afternoon	0	0	0
Dinner	0	0	0

Daily Caloric Intake (kcal/day): (not calculated)

Copy Day Paste Day

Nutrient	Total	dom	lun	mar	mer	gio	ven	sab
Water(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Energy(kcal)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Prot.(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fat(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Carb.(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fibers(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Sugar(g)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Ca(mg)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fe(mg)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Load template... Save as template... OK Cancel

Now it is possible to enter its quantity by enter the quantity and the measurement unit.

The food can be deleted from the list by clicking on the red X near it.

Useful buttons on this dialog box are the following ones:

- **Copy Day:** It copies all the foods and their quantities from the current day (to be pasted into another day)
- **Paste Day:** It pastes all the food of a previously copied day
- **Save as template....:** It saves the current Weekly Diet Planner as a template for another subject
- **Load template....:** It loads a previously saved Weekly Diet Planner for the current subject

Once completed, press **OK** to confirm or **Cancel** to abort:

- Another useful tool for the database management can be found in the *Food search* dialog box.
Here it is possible to:
Add a new food (**Add food...**)
Clicking on this button it is possible to add a new food into the database.

Add or Edit a Food

TIP: Use Food Group 0000 (Favorites) to build a list of favorite foods.

Food Group:

Description:

Primary unit of measurements: equivalent to grams:

Secondary unit of measurements: equivalent to grams:

All nutritional values are for 100g of food

Water(g/100g)	0,000	K(mg/100g)	0,000
Energy(kcal/100g)	0	Na(mg/100g)	0
Prot.(g/100g)	0,000	Vit. C(mg/100g)	0,000
Fat(g/100g)	0,000	Vit. B6(mg/100g)	0,000
Carb.(g/100g)	0,000	Vit. B12(mcg/100g)	0,000
Fibers(g/100g)	0,000	Vit. A(IU/100g)	0
Sugar(g/100g)	0,000	Sat. Fat(g/100g)	0,000
Ca(mg/100g)	0	Acids monouns.(g/100g)	0,000
Fe(mg/100g)	0,000	Acids polyuns.(g/100g)	0,000
Mg(mg/100g)	0,000	Cholest.(mg/100g)	0
P(mg/100g)	0,000	Refuse(%)	0

Select the food group, the food description, the units of measurement (up to 2) and its nutritional facts. It is also possible to edit the existing food groups or add new ones by clicking on the **Manage Groups...** button.

Add or Edit a Food Group

Select the food code to edit, or enter a new code to add a food group to the database

Food Code:

Description:

- Edit a food (Edit food...)

Clicking on this button it is possible to modify the current food into the database. The dialog boxes are the same as in the "Add food" case.

- Delete a food (Delete food...)

Clicking on this button, the current food will be deleted from the database.

Be careful, since deleting a food, all the diets with a reference to this food will be altered.

In this way, it is possible to customise or at worst replace the food database.

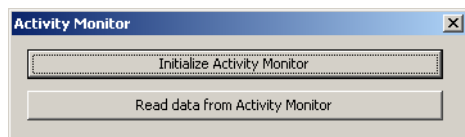
► Activity monitor

The activity monitor test allows to monitor the activity during the past days (up to 60 days).

It is enabled only connecting the Lifecorder Plus (code A-661-115-001) to a PC running the Fitmate software.

Attention: Only the Lifecorder Plus which is compatible with Fitmate software works properly with the Fitmate. Other Lifecorder Plus devices don't communicate with the software and cannot be used with the Fitmate. Please refer to COSMED to purchase a Lifecorder Plus compatible with Fitmate software.

As soon as the test is started, it checks if a Personal weight management test was performed in the current session, since some useful data are gathered directly from this test. However, it is not required to perform Personal Weight Management test before the Activity Monitor test.



When the test is started, the user can:

- Initialize the Activity Monitor
- Read data from the Activity Monitor

In both cases, the Lifecorder Plus must be connected to the PC through a mini-B USB cable (not included, code A-362-315-004).

For the use of the Lifecorder Plus, please refer to its user manual.

Initialize the Activity Monitor

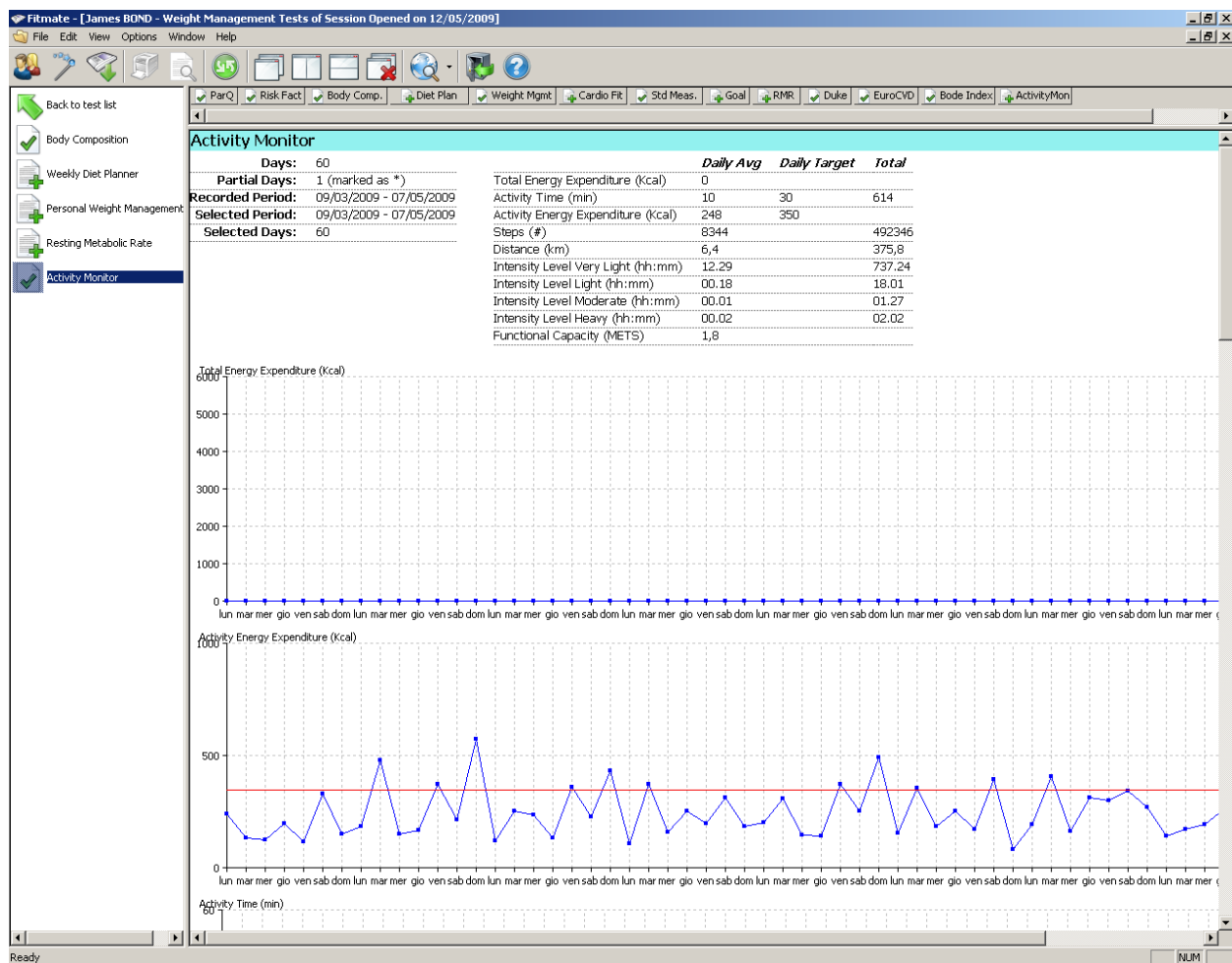
The user can set:

- The target activity (as calories or steps)
- The target activity in minutes
- The physical activity lower and upper limits (in METS)
- The stride length
- The parameters to be displayed on the Lifecorder Plus
- The locked parameters on the Lifecorder Plus (i.e. the parameters which the user can see on its display)

Warning: Initialization of the Activity Monitor will erase all the data currently stored in it.

Read data from the Activity Monitor

Note: The Lifecorder Plus can store data for up to 60 days. After this period, it begins to delete the first days to replace their data with the current ones.



After the data are read by the Fitmate software, it displays statistical information and graphs showing the daily trend of the data. The red line is the daily target, set by the user.

Activity Monitor

Comments:

From: 09/03/2009

To: 07/05/2009

All Data

Export CSV File...

OK Cancel

It is possible, by double clicking on the window, to enter comments, to modify the displayed period or to export data in CSV format for further analysis.

The printed report shows data week by week (a page per week) by means of histograms.

Cardiorespiratory Fitness (Fitmate Pro/Med only)

To perform Cardiorespiratory Fitness assessment enter the folder **Cardiorespiratory fitness** and double click on the correspondent icon.

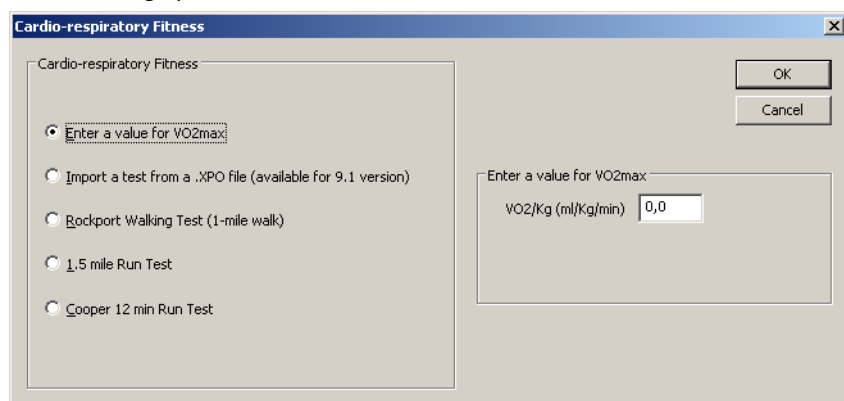
The Cardiorespiratory Fitness test may be performed with a Fitmate Pro/Med and then downloaded on the PC software for the assessment.

For the preparation of the subject and the test execution refer to Chapter IV *Using Fitmate*.

Warning: Maximal exercise testing for the assessment of the cardiorespiratory fitness can be performed only in presence of medical staff and under the supervision of a cardiologist. Sub maximal exercise tests only are allowed in absence of medical staff.

► Execute a VO₂max test

The following options are available:



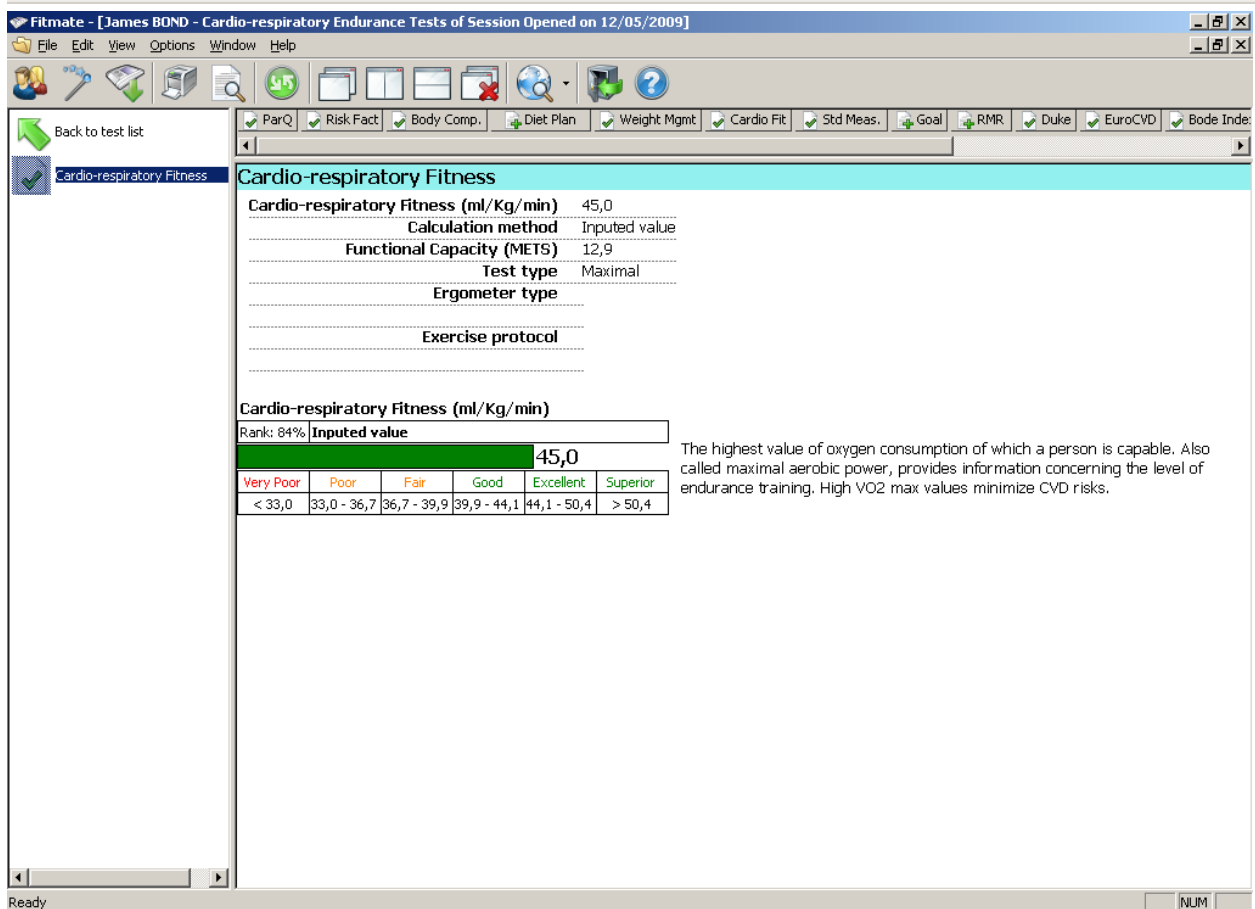
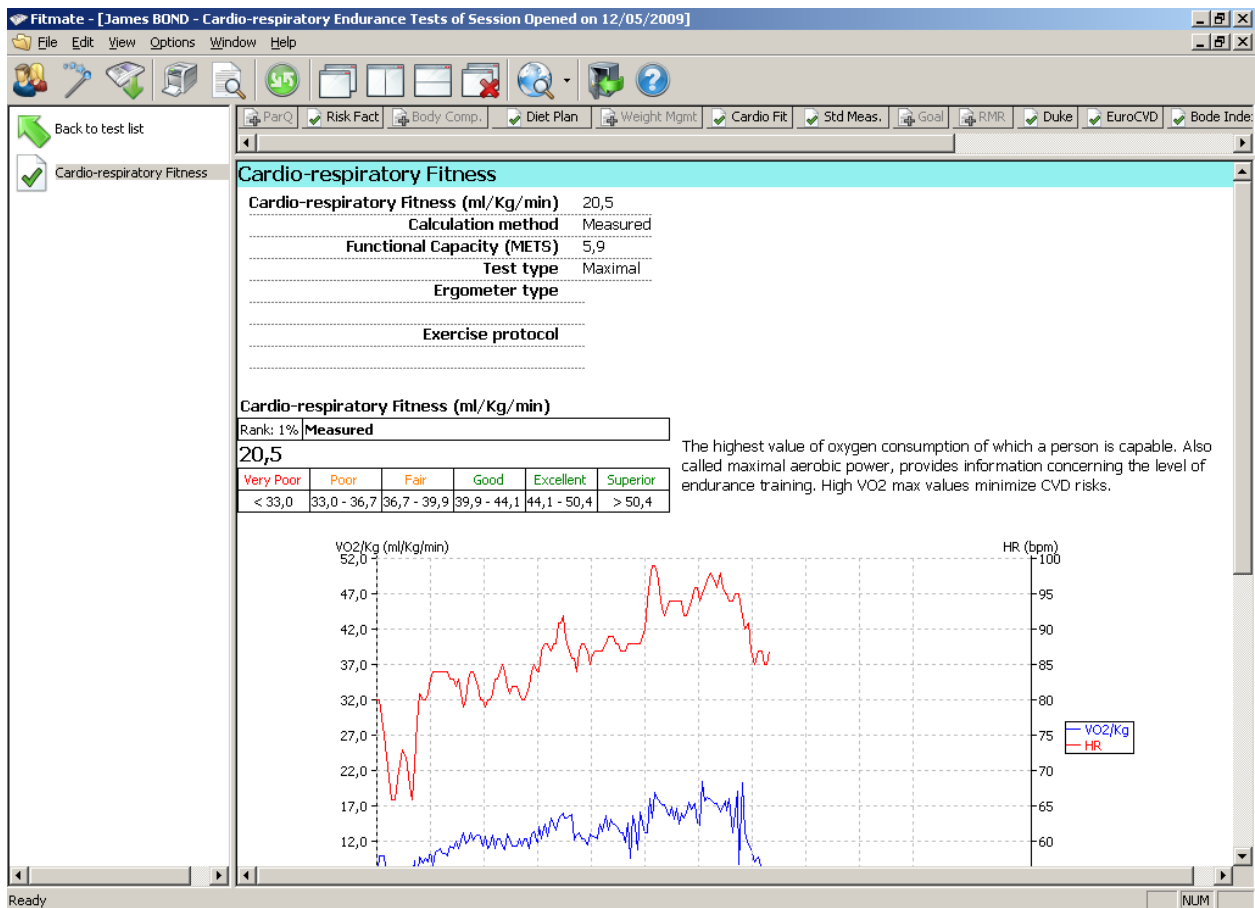
- Insert a value of VO₂/kg if known
- Import a test file in *.xpo format (Test executed with a different COSMED equipment)

Note: The test must be exported with 9.1 CPET software version or higher.

- Enter the value of a Rockport Walking Test (walk for a mile)
- Enter the value of a 1.5 mile Run
- Enter the value of a Cooper test (12 minutes run)

Click **OK** to confirm.

An overall Cardiorespiratory fitness assessment will be displayed on the screen. The aspect will be different if the test is imported from an *.xpo file or not.

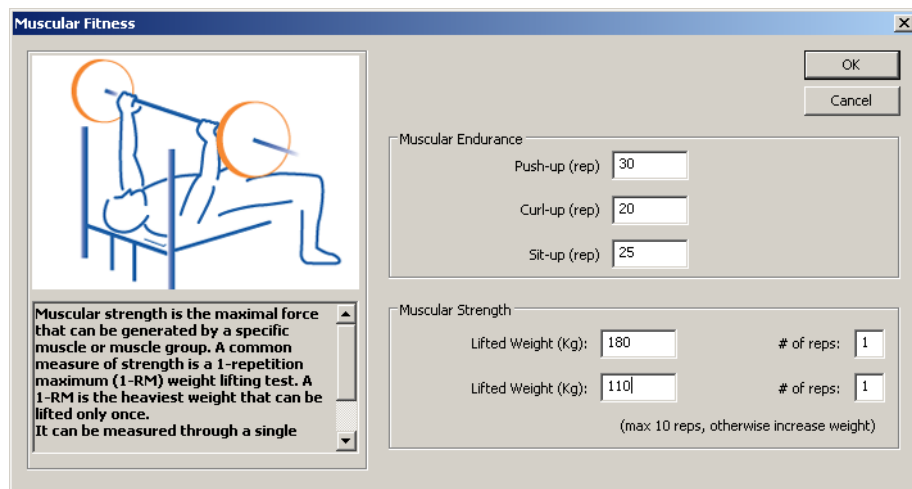


Muscular Fitness (Fitmate Pro only)

► Test execution and data entry

Double click on the icon **Muscular Endurance and Strength**.

If a zero is entered in a field, this value won't be showed neither in the test results nor in the printout.



Muscular Fitness

OK
Cancel

Muscular Endurance

Push-up (rep) 30
Curl-up (rep) 20
Sit-up (rep) 25

Muscular Strength

Lifted Weight (Kg): 180 # of reps: 1
Lifted Weight (Kg): 110 # of reps: 1
(max 10 reps, otherwise increase weight)

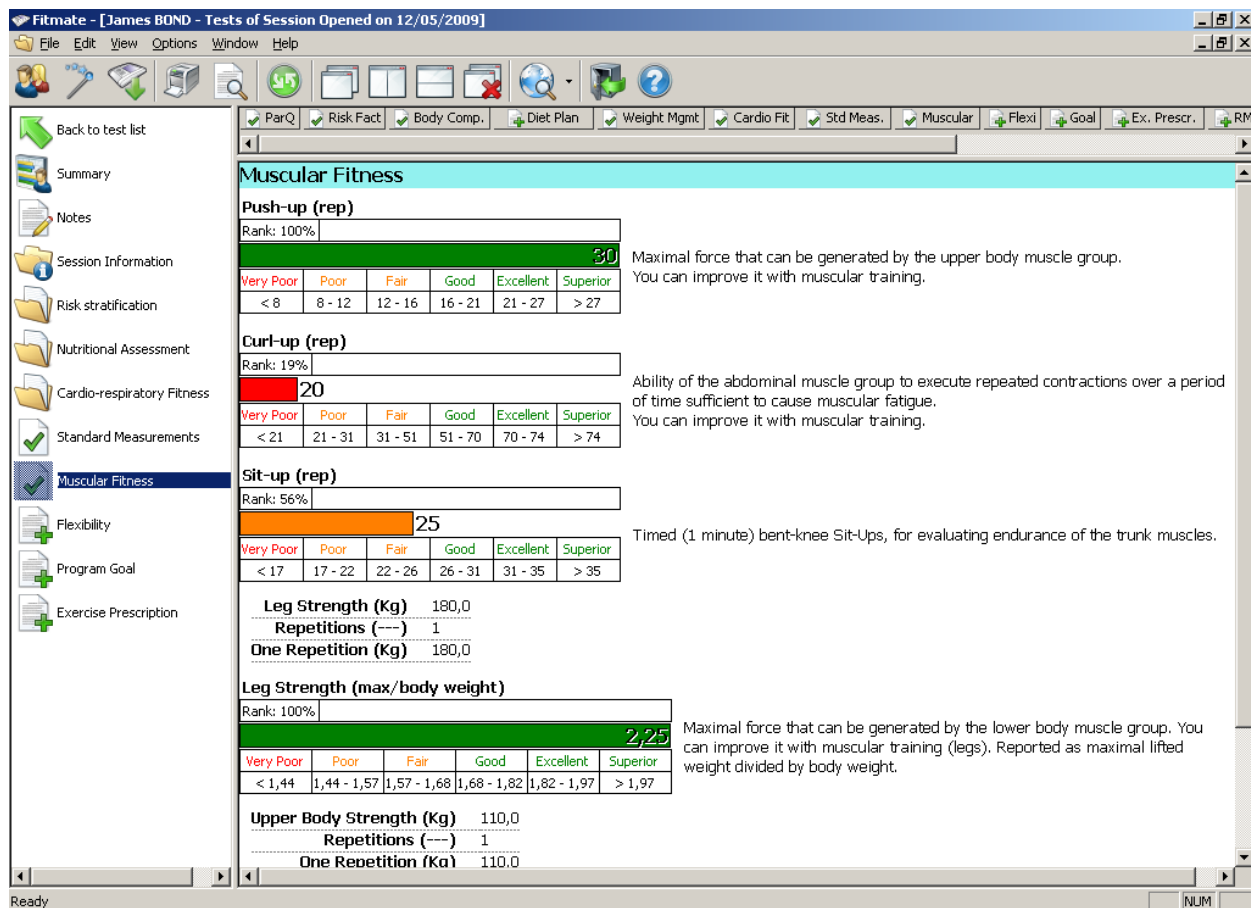
Muscular strength is the maximal force that can be generated by a specific muscle or muscle group. A common measure of strength is a 1-repetition maximum (1-RM) weight lifting test. A 1-RM is the heaviest weight that can be lifted only once. It can be measured through a single

Execute the test as illustrated in the picture on the left side of the screen and described in the bottom of the screen. Then enter the results in the respective fields.

For the *Muscular strength* section, measurements can be performed in two ways:

1. With a single repetition (maximal measurement), by entering 1 in the Reps field and the maximum weight lifted in the field Lifted Weight
2. With maximum 9 repetitions (sub-maximal measurement), by entering the number of repetitions in the Reps field and the weight lifted in the field Lifted Weight. The weight lifted must be the one that the subject cannot lift another time.

Click **OK** to confirm. The evaluation of the muscular fitness will display on the screen.



Fitmate - [James BOND - Tests of Session Opened on 12/05/2009]

File Edit View Options Window Help

ParQ Risk Fact Body Comp Diet Plan Weight Mgmt Cardio Fit Std Meas Muscular Flexi Goal Ex. Prescr. RMI

Muscular Fitness

Push-up (rep)
Rank: 100%
30
Maximal force that can be generated by the upper body muscle group. You can improve it with muscular training.

Very Poor	Poor	Fair	Good	Excellent	Superior
< 8	8 - 12	12 - 16	16 - 21	21 - 27	> 27

Curl-up (rep)
Rank: 19%
20
Ability of the abdominal muscle group to execute repeated contractions over a period of time sufficient to cause muscular fatigue. You can improve it with muscular training.

Very Poor	Poor	Fair	Good	Excellent	Superior
< 21	21 - 31	31 - 51	51 - 70	70 - 74	> 74

Sit-up (rep)
Rank: 56%
25
Timed (1 minute) bent-knee Sit-Ups, for evaluating endurance of the trunk muscles.

Very Poor	Poor	Fair	Good	Excellent	Superior
< 17	17 - 22	22 - 26	26 - 31	31 - 35	> 35

Leg Strength (Kg) 180,0
Repetitions (---) 1
One Repetition (Kg) 180,0

Leg Strength (max/body weight)
Rank: 100%
2,25
Maximal force that can be generated by the lower body muscle group. You can improve it with muscular training (legs). Reported as maximal lifted weight divided by body weight.

Very Poor	Poor	Fair	Good	Excellent	Superior
< 1,44	1,44 - 1,57	1,57 - 1,68	1,68 - 1,82	1,82 - 1,97	> 1,97

Upper Body Strength (Kg) 110,0
Repetitions (---) 1
One Repetition (Kg) 110,0

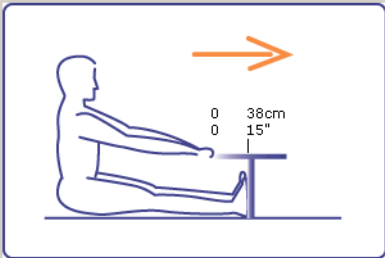
Ready NUM

Flexibility Assessment (Fitmate Pro only)

► Test execution and data entry

To assess the flexibility, double click on the icon **Flexibility**.

Muscular Fitness



Enter the measured value here:

Flexibility (cm)

OK Cancel

-For the sit-and-reach test, a yardstick is placed on the floor and tape is placed across it at a right angle to the 15-inch mark. The participant sits with the yardstick between the legs, with legs extended at right angles to the taped line on the floor. Heels of the feet should touch the edge of the taped line and be about 10 to 12 inches apart. If a standard sit-and-reach box is available, heels should be placed against the edge of the box.
-The participant should slowly reach forward with both hands as far as possible, holding this position momentarily. Be sure that the participant keeps the hands parallel and does not lead with one hand.

Execute the test as illustrated in the picture and described on the left side of the screen. Then enter the test result in the proper field.

Click **OK** to confirm.

The evaluation of the flexibility will display on the screen.

Fitmate - [James BOND - Tests of Session Opened on 12/05/2009]

File Edit View Options Window Help

ParQ Risk Fact Body Comp Diet Plan Weight Mgmt Cardio Fit Std Meas Muscular Flexi Goal Ex. Prescr RM

Flexibility

Flexibility (cm) 32

Flexibility (cm)

Rank: 25%

32

Very Poor	Poor	Fair	Good	Excellent	Superior
< 30	30 - 36	36 - 41	41 - 47	47 - 54	> 54

Ability to move a joint through its complete range of motion.
You can improve it with stretching.

Back to test list
Summary
Notes
Session Information
Risk stratification
Nutritional Assessment
Cardio-respiratory Fitness
Standard Measurements
Muscular Fitness
Flexibility
Program Goal
Exercise Prescription

Ready

NUM

Fitness goals

► Set the goal to reach

To set the goals to reach, double click on the icon **Program goal**.

A window reporting the results summary of the tests performed and the related goal (if entered) will appear. Select the interval time for reaching the desired goals.

Program Goal

Beginning of the program: 12/05/2009 End of the program: 12/05/2009

Rank		Result	Goal
	Body Composition (FAT%) (%)	22,0	0,0
	Waist-to-Hip Ratio (---)	1,10	0,00
	Resting Heart Rate (bpm)	64	0
	Systolic Blood Pressure (mmHg)	125	0
	Diastolic Blood Pressure (mmHg)	82	0
	Cardio-respiratory Fitness (ml/Kg/min)	45,0	0,0
	Push-up (rep)	30	0
	Curl-up (rep)	20	0
	Sit-up (rep)	25	0
	Leg Strength (max/body weight)	2,25	0,00
	Upper Body Strength (max/body weight)	1,38	0,00
	Flexibility (cm)	32	0

Double-click on an item to open the input dialog

Rank: Very poor Good Excellent

OK

Double click on a string to set a goal for that specific test. Enter the target value in the dialog box that appears or move the cursor of the bar with the mouse till the desired value is reached.

Set a Target

Target value: 29

OK Cancel

Tip: you can set the target dragging the Target Line in this gauge

Curl-up (rep)

Rank: 19% Target: 29

20

Very Poor	Poor	Fair	Good	Excellent	Superior
< 21	21 - 31	31 - 51	51 - 70	70 - 74	> 74

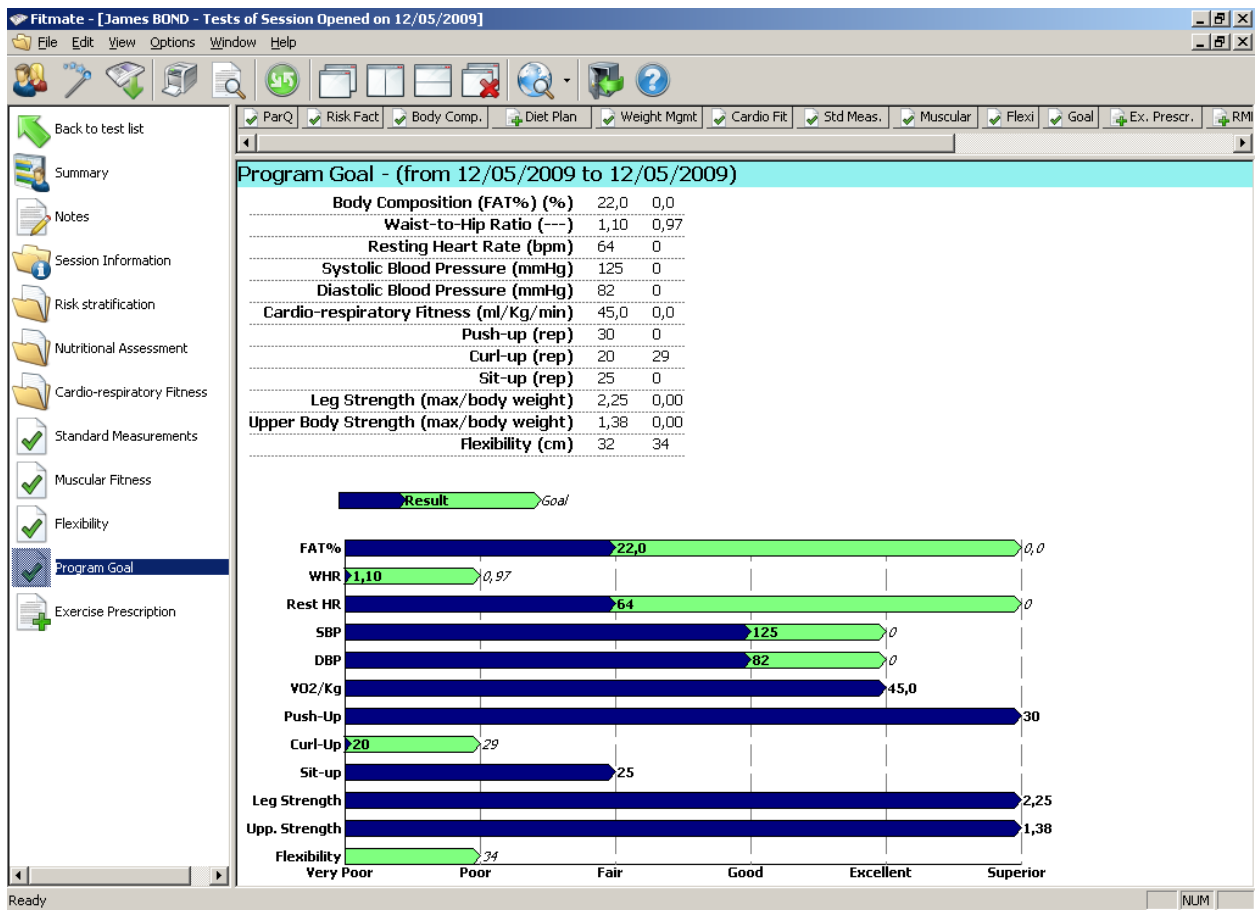
Click **OK** to confirm.

The window will accommodate the new goals to reach.

Repeat the operation for every test.

Once finished click **OK** to confirm.

The updated summary report will display on the screen.

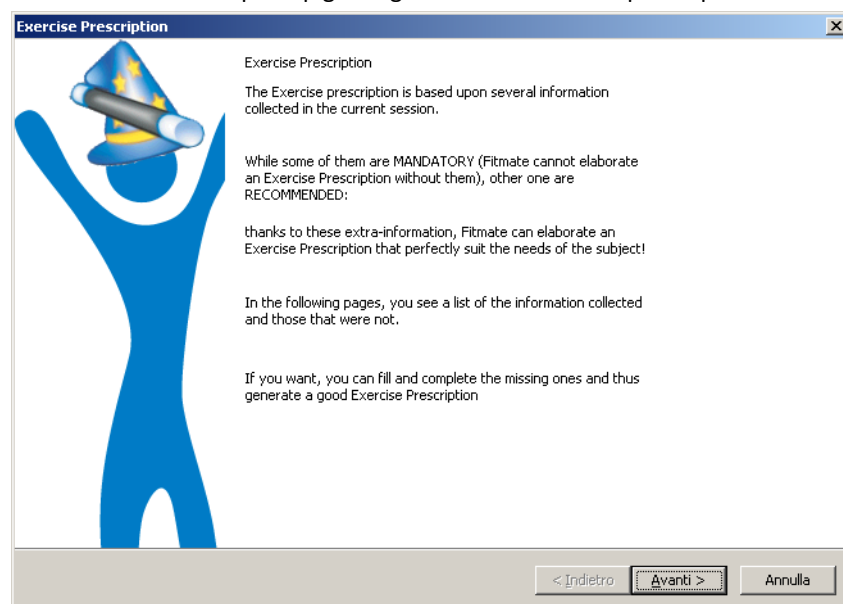


Exercise prescription (Fitmate Pro only)

► Prescribing an exercise program

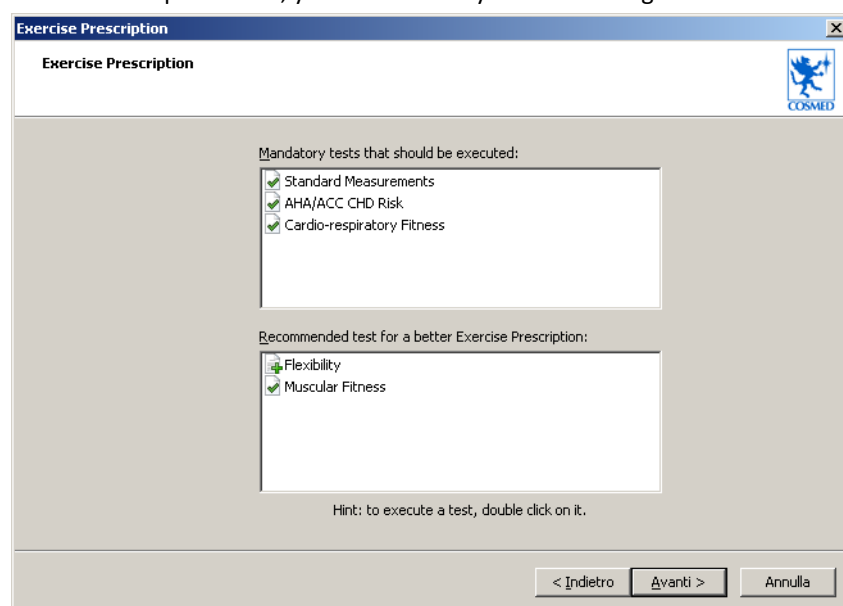
Double click on the icon **Exercise Prescription** to prescribe an exercise program.

A Wizard menu will open up guiding user to the exercise prescription.



Press **Next>** to open a window which shows the mandatory and the recommended tests in order to elaborate an exercise prescription.

If a test is not performed, you can start it by double clicking the icon.



Press **Next>** to open a window in which you can set the program goal, the muscular fitness goal and the number of sessions per week.

Exercise Prescription

Program goal: Overall fitness improvement

Muscular Fitness Goal: Power

Sessions per week for training: 0

< Indietro Avanti > Annulla

Click **Next>** to open a window in which you can set the exercise details.

Exercise Prescription

Risk Stratification: Lower Risk Defaults

Weeks for progress: 4 ☐ Supervised Training

Cardio-vascular Muscular Training Stretching

Time (min)	Exercise	HR (bpm)	Power/Sp...	Elev...

Add... Del...

< Indietro Avanti > Annulla

In order to do that, you must enter the risk stratification (low, moderate, high) and the training duration (in weeks). You can indicate if the training must be supervised (by selecting the check box) and/or enter default values, clicking on **Defaults**.

In the lower part of the window, for each exercise type (cardio-vascular, muscular training or stretching) you can enter the exercises and details about them. **Add...** adds an exercise to the list, **Del...** deletes the selected one.

Click **Next>** to close the wizard. The exercise prescription will display on the screen.

Fitmate - [James BOND - Tests of Session Opened on 12/05/2009]

File Edit View Options Window Help

ParQ Risk Fact Body Comp. Diet Plan Weight Mgmt Cardio Fit Std Meas. Muscular Flexi Goal Ex. Prescr. RMI

Back to test list

Summary

Notes

Session Information

Risk stratification

Nutritional Assessment

Cardio-respiratory Fitness

Standard Measurements

Muscular Fitness

Flexibility

Program Goal

Exercise Prescription

Exercise Prescription

Dear James,

I would like to thank you for participating in our recent fitness screening. The results of your assessment (based upon norms for your age and sex) are attached.

Following a thorough review of your health risk appraisal and fitness assessment we identified **no cardiovascular risk factors** based upon criteria from the American College of Sports Medicine. Based upon your age, family history and health status, we find no reason to limit your participation in this exercise program. In order to control/reduce risk factors, achieve a cardiovascular benefit, and burn stored fat as a primary fuel, it is important that you adhere to the following exercise guidelines:

Your exercise prescription as described to you at the time of the assessment is comprised of three stages:

- Initial conditioning stage, 6-8 weeks.
- Improved conditioning stage, 4-8 months.
- A maintenance conditioning stage, lifetime.

Initial Improvement Maintenance

In each of these phases, the components of the program (duration and intensity of cardiovascular training, strength training and flexibility development) will gradually change based upon your individual progress. In this initial stage the goal is to create a strong foundation from which your exercise prescription will be developed. We will focus on gradual increases in training to minimize risks of injury, teach proper technique and create an environment where you are able to commit to a lifestyle of training. We recommend that you consult with your exercise specialist in 4 to 6 weeks to review your progress and update the exercise prescription.

Frequency of exercise sessions

Your exercise prescription has been prepared based on "days/week" sessions/week.

Frequency (# per week): 3

Warm-up

Duration: 5 to 10 minutes

 *We recommend a warm-up activity similar to the one used during the cardiovascular training.*

Unsupervised

Low CVD Risk

3 sessions/week

5-10 min

Ready NUM

Appendix

Conformity declaration

Manufacturer: COSMED S.r.l.

Address: Via dei Piani di Monte Savello 37,
00041 Pavona di Albano Laziale (RM)
ITALY
phone: +39-06-9315492
fax: +39-06-9314580

manufacturer of the following equipment:

Fitmate
Fitmate Pro
Fitmate Med
Fitmate GS

declares under his sole responsibility that:

- the above listed equipment comply with the essential requirements of the Annex I of the Medical Device Directive 93/42/EEC;
- are classified in Class IIa;
- their design, manufacturing and final checks are performed according the Cosmed's Quality System, conform to ISO 9001:2008 and ISO13485:2003 Norms, certified by CERMET (certificates nr. 387-A and 387-M);
- are CE marked according to the Medical Device Directive 93/42/EEC and certified by CERMET (certificate nr. MED 9811).

The equipment conform with the following specifications:

Safety: CEI 62-5/IEC 60601-1/EN 60601-1

EMC: EN 60601-1-2

Service - Warranty

► Warranty and limitation of liability

COSMED provides a one (1) year limited warranty from the date of the original sale of COSMED products. All COSMED products are guaranteed to be free from defect upon shipment. COSMED's liability for products covered by this warranty is limited exclusively to replacement, repair, or issuance of a credit for the cost of a defective product, at the sole discretion of COSMED. COSMED shall not be liable under the foregoing warranty unless (i) COSMED is promptly notified in writing by Buyer upon discovery of defect; (ii) the defective product is returned to COSMED, transportation charges prepaid by Buyer, (iii) the defective product is received by COSMED no later than four weeks after the last day of the one (1) year limited warranty period; and (iv) COSMED's examination of the defective product establishes, to COSMED's exclusive satisfaction, that such defect was not caused by misuse, neglect, improper installation, unauthorised repair or alteration, or accident. If the product is manufactured by a third-party, COSMED shall make available for the Buyer's benefit only those warranties which COSMED has received from the third-party manufacturer(s). COSMED hereby specifically disclaims any and all warranties and/or liabilities arising from defect(s) and/or damage(s) to and/or caused by products manufactured by third-party manufacturers. Buyer must obtain written authorisation from COSMED prior to the repair or alteration of COSMED products(s). Failure of Buyer to obtain such written authorisation shall void this warranty.

COSMED hereby specifically disclaims any and all other warranties of any kind, whether express or implied, in fact or by law, including, but without limitation, any and all warranties of merchantability and/or fitness for a particular purpose.

COSMED shall not be liable for special, indirect and/or consequential damages, nor for damages of any kind arising from the use of any COSMED's products, whether said products are used alone or in combination with other products or substances.

Determination of the suitability of any of COSMED's product(s) furnished hereunder for the use contemplated by Buyer is the sole risk and responsibility of Buyer, and COSMED has no responsibility in connection therewith. Buyer assumes all risks and liabilities for loss, damage or injury to persons or property of Buyer or others arising out of the use or possession of COSMED's products.

The limited warranty as herein above set forth shall not be enlarged, diminished, modified or affected by, and no obligation or liability shall arise or grow out of, the renderings of technical advice or service by COSMED, its agents or employees in connection with Buyer's order or use of the product(s) furnished hereunder.

► Return goods policy for warranty or non warranty repair

Goods shipped to COSMED for repair are subject to the following conditions:

1. Goods may only be returned after you receive a **Service Return Number (SRN)** from COSMED S.r.l.
2. Place your SRN report and Packing List outside the package.
3. Goods returned must be shipped with freight and insurance charges prepaid. **Collect shipments will not be accepted.**
4. The following list of goods are not eligible for return unless proven defective.
 - Special order items
 - Expendable products
 - Goods held over 30 days from COSMED's invoice date.
 - Used goods not in original shipping containers.
 - Goods which have been altered or abused in any way.
5. The following parts are not covered by warranty:
 - consumables
 - fragile glass or plastic parts
 - rechargeable batteries
 - damages due to use of the device not conforming to the indication reported in this manual

► Repair Service Policy

Goods returned to seller for Non-Warranty repair will be subject to conditions 1, 2, 3, 4.

The returned goods need to re-enter COSMED together with the customs documents (Pro-forma Invoice and Customs Paper) as requested by the Italian law.

- The shipment has to be qualified as a Temporary Export.
- All the goods returned to COSMED without the customs papers will not be accepted.

For European Community members:

Pro-Forma invoice complete with:

-
- Number
 - Description of the goods
 - Quantity
 - Serial Number
 - Value in €
 - Number of parcel
 - Gross weight
 - Net weight
 - Reason for resent (i.e. Resent for repair)

In case you should send the system for repair please contact the nearest service centre or contact COSMED at the following address:

COSMED S.r.l.

Via dei Piani di Monte Savello 37
P.O. Box 3
00041 Pavona di Albano - Rome, Italy
tel. +39 (06) 9315492
fax +39 (06) 9314580
E-mail: customersupport@cosmed.it

For USA customers only please contact:

COSMED USA Inc

2211 North Elston, Suite 305
Chicago IL 60614 USA
Phone: +1 (773) 645-8113
Fax: +1 (773) 645-8116
email: usa.sales@cosmed.it

To ensure that you receive efficient technical assistance, please specify as precisely as possible the nature of the problem as it is specified on the assistance information form.

We advise you to save the original packaging. You may need it in case to ship the unit to a technical assistance centre.

Fitmate Registration Form

(fax to +39-069314580 or email to register@fitmate.net)

First Name*:.....

Last Name*:.....

Institute/Organization/Company:.....

Department:.....

Address*:.....

City*:.....

ZIP*:

Country*:

Phone and Fax*:.....

Email:

Model*: ☐ FitMate ☐ FitMate PRO ☐ FitMate MED ☐ FitMate GS

Serial Number*¹:.....

Key Code*²

* Mandatory field

How would you like to receive the Activation Codes?

☐ e-mail ☐ fax ☐ voice telephone

Notes:.....

.....

.....

.....

.....

.....

After having read the privacy information, I express my permission to my personal data treatment, according to Privacy Law 196/2003, in order to place an order, register a product, request a service, answer a survey, enter a contest, correspond with you, and to define my commercial profile for your marketing and advertising purposes. The data can be provided to selected business partners and companies which carry on business for Cosmed Srl. I am aware that, denying the consent, Cosmed cannot supply the requested service.

☐ I accept

☐ I don't accept

Signature.....

¹ Serial Number has the following format: YYYYMM#### and it is reported on the bottom of the instrument

² Key Code is composed with two numbers of 10 characters prompted by the Fitmate Unit during the activation process.

Privacy Information

Dear Customer,

we inform you that your personal data are gathered and will be used by Cosmed Srl in conformity with the requirements of the Italian privacy law (Decreto Legislativo 196/2003). We believe it is important for you to know how we treat your personal data.

► Personal data treatment and purposes

We request and process your personal data for the following purposes:

- a) To place an order, register a product, request a service, answer a survey, enter a contest, allow communication with us and to supply necessary authorities with the required information.
- b) To define your commercial profile.
- c) To use your commercial profile for marketing or advertising purposes.
- d) For necessary accounting procedures, such as emailing commercial invoices.
- e) To provide information to the selected business partners needed to supply your service.

► How your personal data are treated

Your personal data will be stored in electronic format, and protected at the best from destruction, loss (even accidental), not authorized accesses, not allowed treatment or use not in conformity with the purposes above listed.

► The consent is optional, but...

If you deny the consent, we regret we cannot supply the service.

► Holder of the treatment

The holder of the treatment is Cosmed Srl, Via dei Piani di Monte Savello 37, Pavona di Albano Laziale (RM). The responsible of the personal data treatment is indicated in the documentation stored by Cosmed Srl itself.

► Customer rights

In accordance with Art.7, you may:

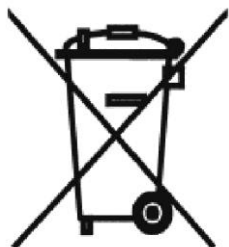
- a) Obtain confirmation of the existence and sharing of your personal data.
- b) Obtain information on the:
 - updating, correction or integration of your data;
 - deletion or transformation of your personal data;
- c) Deny your consent to treatment of your personal data;

These rights can be exercised by a request in writing to the holder responsible for your personal data.

Waste of electrical and electronic equipment

Fitmate is an electronic equipment and can not be disposed as unsorted municipal waste. Electric and electronic equipment, according to European Directive 2002/96/EEC, must be collected separately. Otherwise it can cause dangerous consequences for the environment and human health.

The crossed-out wheeled bin means that the product must be taken to separate collection at the product end-of-life.



Safety and conformity

Safety

IEC 60601-1 / EN 60 601-1;

Find reported below the complete classification of the device:

- Internally powered equipment type BF device (used stand alone), class II type BF device (used connected to mains)
- Protection against water penetration: IP41
- Non sterile device
- Device not suitable in the presence of flammable anaesthetics;
- Continuous functioning equipment;

EMC

The system meets the EMC Directive 89/336 and the norm IEC 60601-1-2

Quality Assurance

UNI EN ISO 9001:2008 (Registration n° 387-A Cermet)

UNI EN ISO 13485:2003 (Registration n° 387-M Cermet)

Medical Device Directive (CE mark)

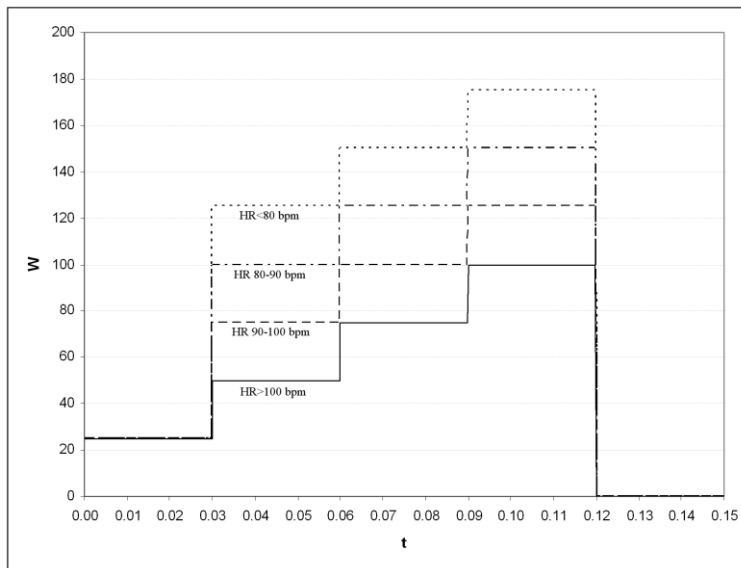
MDD 93/42/EEC (Notified Body 0476).

Class IIa

Exercise protocols

► Protocols for cycloergometers

Sub-maximal protocol (auto)



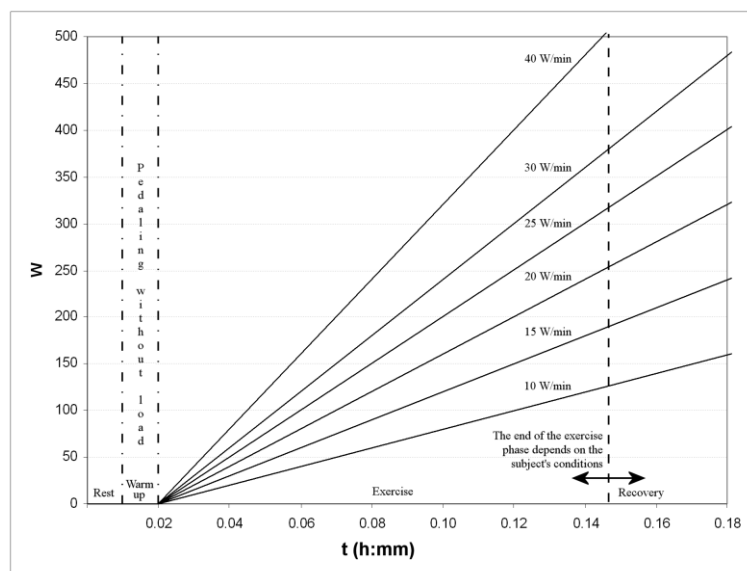
Warm-up: 3 minutes a 25 Watt.

Exercise: according to the HR at the end of the warm-up, the load is set as in the following table:

dur.	HR<80 bpm	HR 80-89 bpm	HR 90-100 bpm	HR>100 bpm
3'	125W	100W	75W	50W
3'	150W	125W	100W	75W
3'	175W	150W	125W	100W

Recovery will follow. The protocol can terminate before the end if the end of test condition is reached, or you stop it manually.

Bike-Ramp 10W/min (patients, limited exercise tolerance)



Rest: 1 minute without load and activity.

Warm-up: 1 minute without load

Exercise: 17 minutes with load constantly growing 10W per minute.

Recovery will follow. The protocol can terminate before the end if the end of test condition is reached, or you stop it manually.

Bike-Ramp 15W/min (elderly people/deconditioned)

As the Bike-Ramp 10W/min protocol, the load increment is 15 W/min.

Bike-Ramp 20W/min (sedentary)

As the Bike-Ramp 10W/min protocol, the load increment is 20 W/min.

Bike-Ramp 25W/min (men average condition, women fit)

As the Bike-Ramp 10W/min protocol, the load increment is 25 W/min.

Bike-Ramp 30W/min (men fit, women athlete)

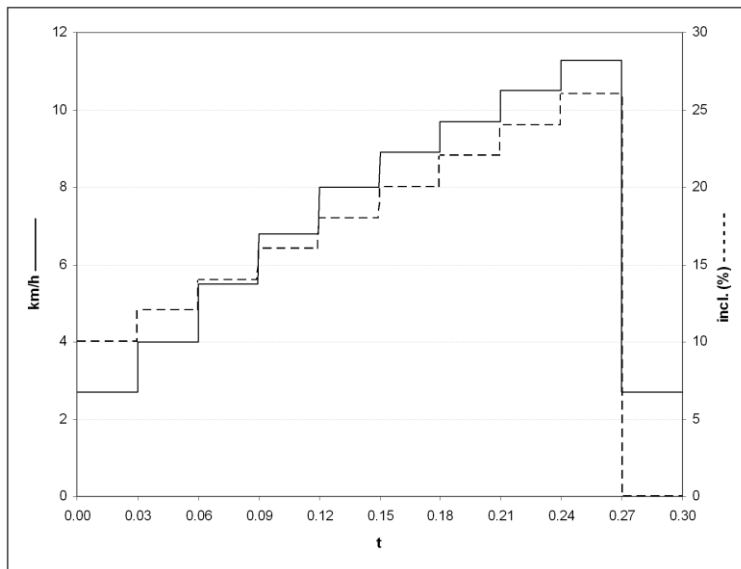
As the Bike-Ramp 10W/min protocol, the load increment is 30 W/min.

Bike-Ramp 40W/min (men athlete)

As the Bike-Ramp 10W/min protocol, the load increment is 40 W/min.

► Protocols for treadmills

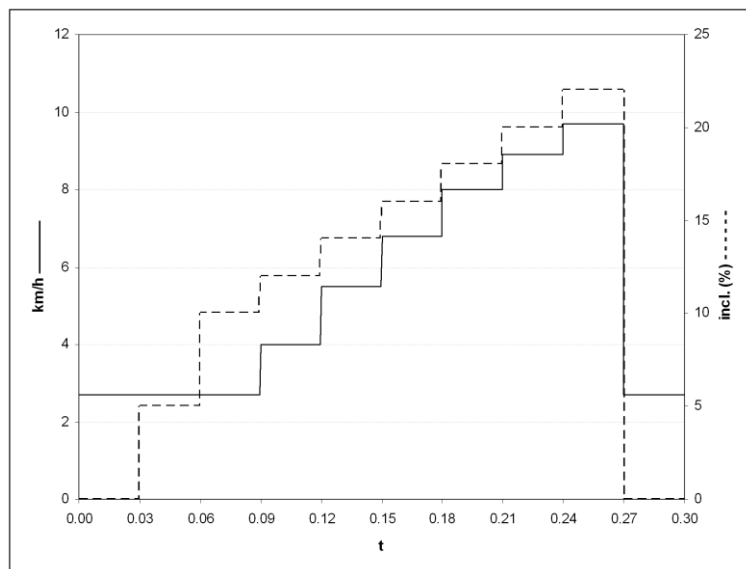
Bruce



Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	2.7	1.7	10
03:00	4.0	2.5	12
06:00	5.5	3.4	14
09:00	6.8	4.2	16
12:00	8.0	5.0	18
15:00	8.9	5.5	20
18:00	9.7	6.0	22
21:00	10.5	6.5	24
24:00	11.3	7.0	26
27:00	2.7	1.7	0 (recovery)

The protocol can terminate before the end if the end of test condition is reached, or you stop it manually.

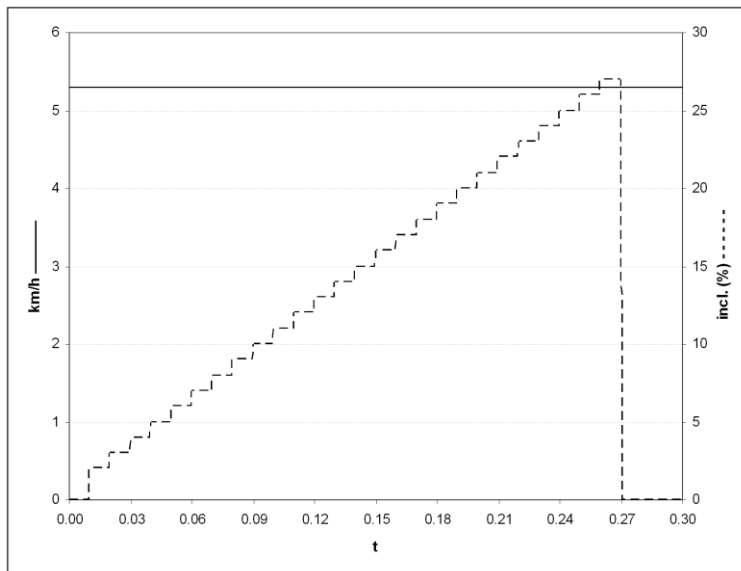
Modified Bruce



Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	2.7	1.7	0
03:00	2.7	1.7	5
06:00	2.7	1.7	10
09:00	4.0	2.5	12
12:00	5.5	3.4	14
15:00	6.8	4.2	16
18:00	8.0	5.0	18
21:00	8.9	5.5	20
24:00	9.7	6.0	22
27:00	2.7	1.7	0 (recovery)

The protocol can terminate before the end if the end of test condition is reached, or you stop it manually.

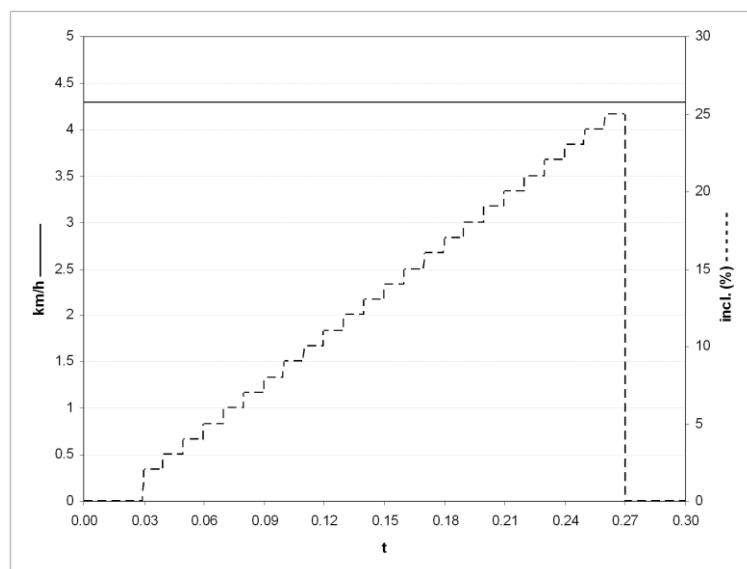
Balke



Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	5.3	3.3	0
01:00	5.3	3.3	2
02:00	5.3	3.3	3
03:00	5.3	3.3	4
04:00	5.3	3.3	5
05:00	5.3	3.3	6
06:00	5.3	3.3	7
07:00	5.3	3.3	8
08:00	5.3	3.3	9
09:00	5.3	3.3	10
10:00	5.3	3.3	11
11:00	5.3	3.3	12
12:00	5.3	3.3	13
13:00	5.3	3.3	14
14:00	5.3	3.3	15
15:00	5.3	3.3	16
16:00	5.3	3.3	17
17:00	5.3	3.3	18
18:00	5.3	3.3	19
19:00	5.3	3.3	20
20:00	5.3	3.3	21
21:00	5.3	3.3	22
22:00	5.3	3.3	23
23:00	5.3	3.3	24
24:00	5.3	3.3	25
25:00	5.3	3.3	26
26:00	5.3	3.3	27
27:00	5.3	3.3	0 (recovery)

The protocol can terminate before the end if the end of test condition is reached, or you stop it manually.

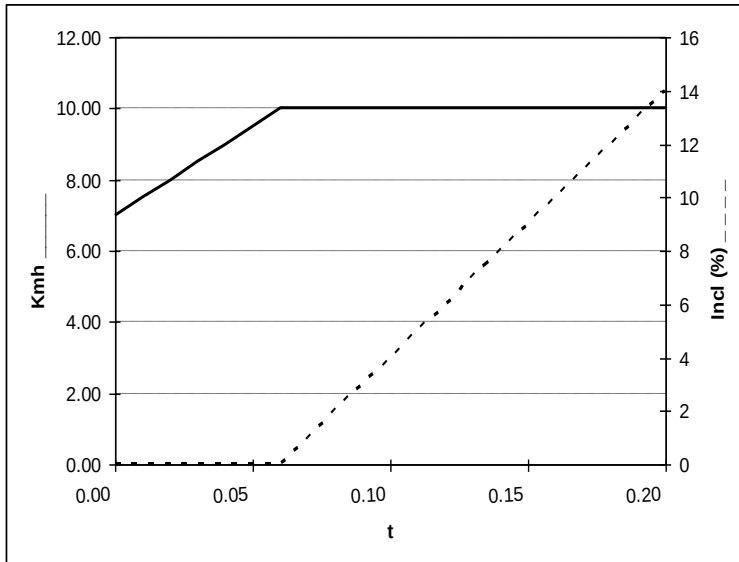
Modified Balke



Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	4.3	2.6	0 (warm-up)
02:00	4.3	2.6	0
03:00	4.3	2.6	2
04:00	4.3	2.6	3
05:00	4.3	2.6	4
06:00	4.3	2.6	5
07:00	4.3	2.6	6
08:00	4.3	2.6	7
09:00	4.3	2.6	8
10:00	4.3	2.6	9
11:00	4.3	2.6	10
12:00	4.3	2.6	11
13:00	4.3	2.6	12
14:00	4.3	2.6	13
15:00	4.3	2.6	14
16:00	4.3	2.6	15
17:00	4.3	2.6	16
18:00	4.3	2.6	17
19:00	4.3	2.6	18
20:00	4.3	2.6	19
21:00	4.3	2.6	20
22:00	4.3	2.6	21
23:00	4.3	2.6	22
24:00	4.3	2.6	23
25:00	4.3	2.6	24
26:00	4.3	2.6	25
27:00	4.3	2.6	0 (recovery)

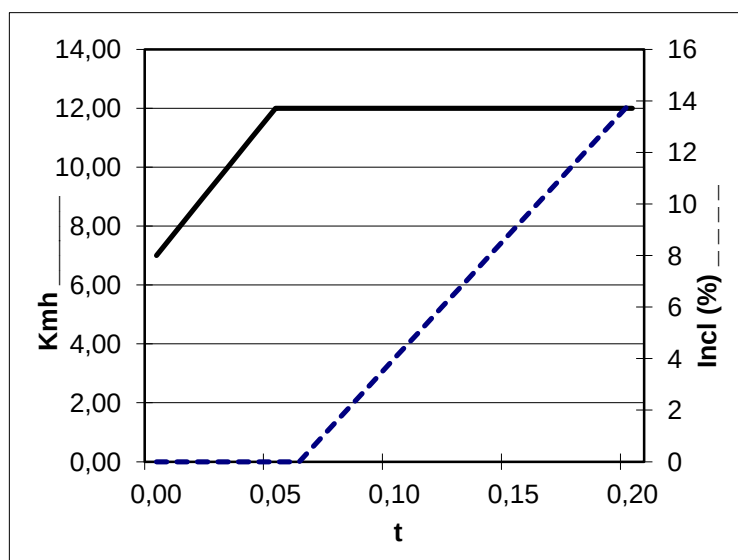
The protocol can terminate before the end if the end of test condition is reached, or you stop it manually.

Run 10 Km/6.2 mph



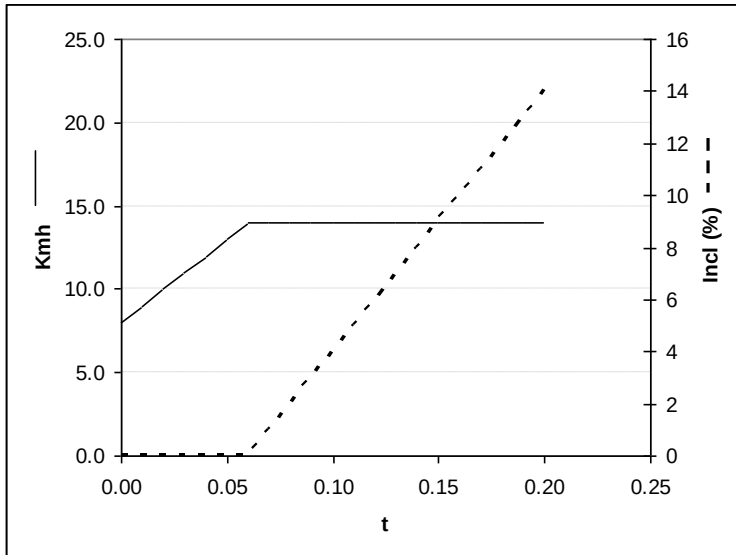
Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	7.0	4.4	0
01:00	7.5	4.7	0
02:00	8.0	5.0	0
03:00	8.5	5.3	0
04:00	9.0	5.6	0
05:00	9.5	5.9	0
06:00	10.0	6.2	0
07:00	10.0	6.2	1
08:00	10.0	6.2	2
09:00	10.0	6.2	3
10:00	10.0	6.2	4
11:00	10.0	6.2	5
12:00	10.0	6.2	6
13:00	10.0	6.2	7
14:00	10.0	6.2	8
15:00	10.0	6.2	9
16:00	10.0	6.2	10
17:00	10.0	6.2	11
18:00	10.0	6.2	12
19:00	10.0	6.2	13
20:00	10.0	6.2	14

Run 12 Km/h/7.5 mph



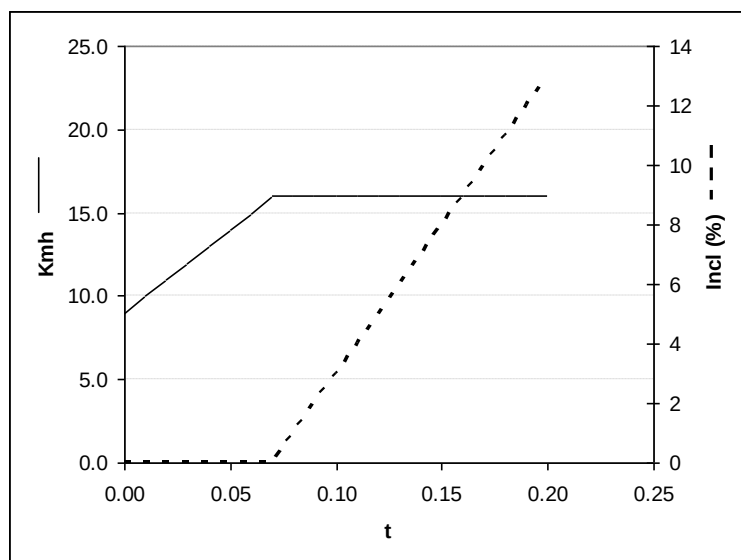
Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	7.0	4.4	0
01:00	8.0	5.0	0
02:00	9.0	5.6	0
03:00	10.0	6.2	0
04:00	11.0	6.9	0
05:00	12.0	7.5	0
06:00	12.0	7.5	2
07:00	12.0	7.5	4
08:00	12.0	7.5	6
09:00	12.0	7.5	8
10:00	12.0	7.5	10
11:00	12.0	7.5	12
12:00	12.0	7.5	14
13:00	12.0	7.5	16
14:00	12.0	7.5	18
15:00	12.0	7.5	20
16:00	12.0	7.5	22
17:00	12.0	7.5	24
18:00	12.0	7.5	26
19:00	12.0	7.5	28
20:00	12.0	7.5	30

Run 14 Km/8.7 mph



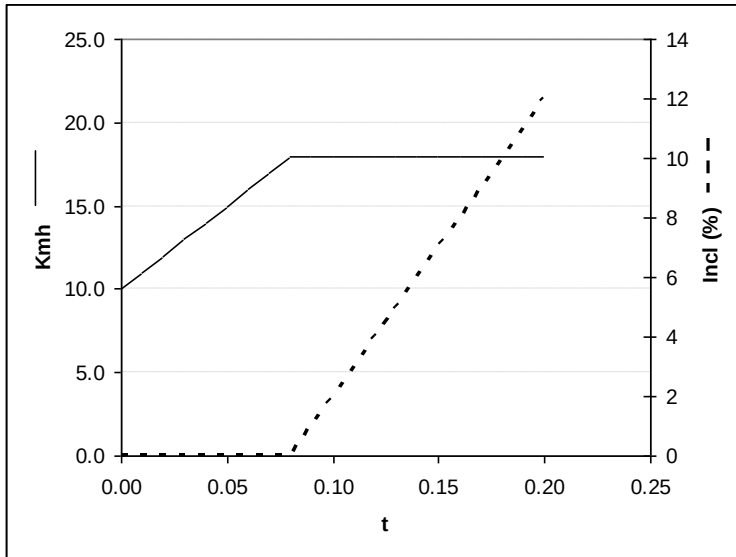
Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	8.0	5.0	0
01:00	9.0	5.6	0
02:00	10.0	6.2	0
03:00	11.0	6.9	0
04:00	12.0	7.5	0
05:00	13.0	8.1	0
06:00	14.0	8.7	0
07:00	14.0	8.7	1
08:00	14.0	8.7	2
09:00	14.0	8.7	3
10:00	14.0	8.7	4
11:00	14.0	8.7	5
12:00	14.0	8.7	6
13:00	14.0	8.7	7
14:00	14.0	8.7	8
15:00	14.0	8.7	9
16:00	14.0	8.7	10
17:00	14.0	8.7	11
18:00	14.0	8.7	12
19:00	14.0	8.7	13
20:00	14.0	8.7	14

Run 16 Km/10 mph



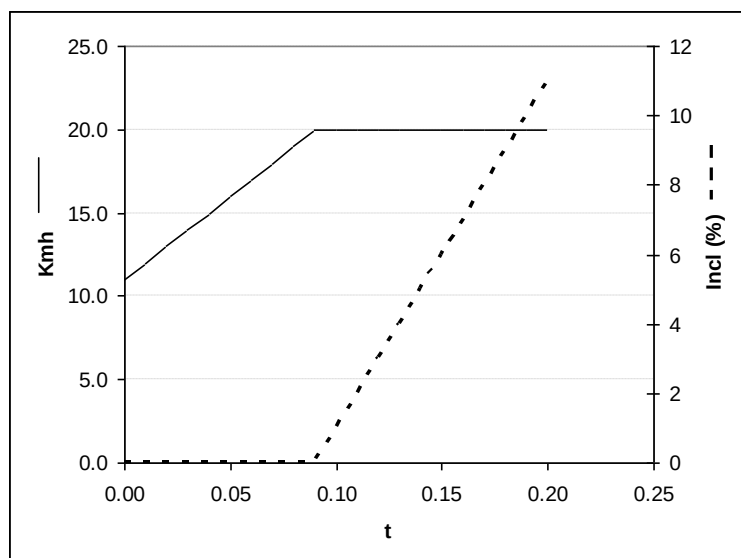
Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	9.0	5.6	0
01:00	10.0	6.2	0
02:00	11.0	6.9	0
03:00	12.0	7.5	0
04:00	13.0	8.1	0
05:00	14.0	8.7	0
06:00	15.0	9.4	0
07:00	16.0	10.0	0
08:00	16.0	10.0	1
09:00	16.0	10.0	2
10:00	16.0	10.0	3
11:00	16.0	10.0	4
12:00	16.0	10.0	5
13:00	16.0	10.0	6
14:00	16.0	10.0	7
15:00	16.0	10.0	8
16:00	16.0	10.0	9
17:00	16.0	10.0	10
18:00	16.0	10.0	11
19:00	16.0	10.0	12
20:00	16.0	10.0	13

Run 18 Km/11.2 mph



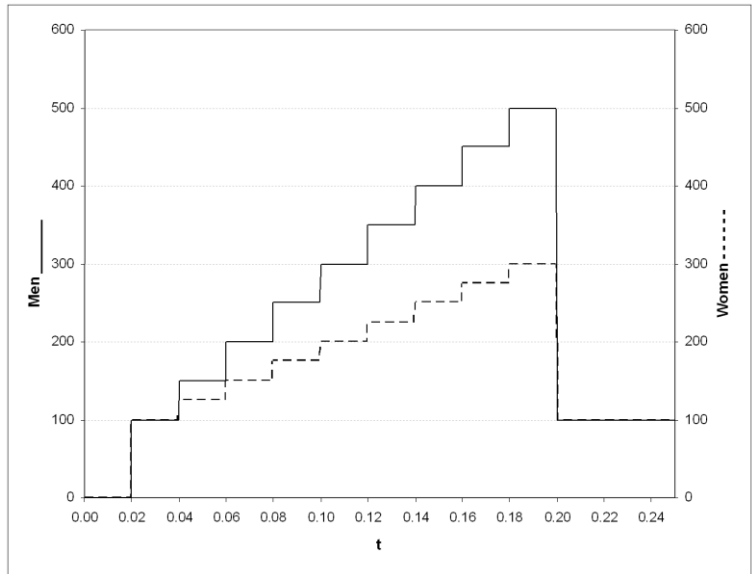
Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	10.0	6.2	0
01:00	11.0	6.9	0
02:00	12.0	7.5	0
03:00	13.0	8.1	0
04:00	14.0	8.7	0
05:00	15.0	9.4	0
06:00	16.0	10.0	0
07:00	17.0	10.6	0
08:00	18.0	11.2	0
09:00	18.0	11.2	1
10:00	18.0	11.2	2
11:00	18.0	11.2	3
12:00	18.0	11.2	4
13:00	18.0	11.2	5
14:00	18.0	11.2	6
15:00	18.0	11.2	7
16:00	18.0	11.2	8
17:00	18.0	11.2	9
18:00	18.0	11.2	10
19:00	18.0	11.2	11
20:00	18.0	11.2	12

Run 20 Km/12.4 mph



Time (mm:ss)	Speed (km/h)	Speed (mph)	Incline (%)
00:00	11.0	6.9	0
01:00	12.0	7.5	0
02:00	13.0	8.1	0
03:00	14.0	8.7	0
04:00	15.0	9.4	0
05:00	16.0	10.0	0
06:00	17.0	10.6	0
07:00	18.0	11.2	0
08:00	19.0	11.8	0
09:00	20.0	12.5	0
10:00	20.0	12.5	1
11:00	20.0	12.5	2
12:00	20.0	12.5	3
13:00	20.0	12.5	4
14:00	20.0	12.5	5
15:00	20.0	12.5	6
16:00	20.0	12.5	7
17:00	20.0	12.5	8
18:00	20.0	12.5	9
19:00	20.0	12.5	10
20:00	20.0	12.5	11

Astrand



dur.	Load men	Load women	
1'	0W	0W	Rest
1'	0W	0W	Warm up
2'	100W	100W	Exercise
2'	150W	125W	
2'	200W	150W	
2'	250W	175W	
2'	300W	200W	
2'	350W	225W	
2'	400W	250W	
2'	450W	275W	
2'	500W	300W	

Recovery will follow. The protocol can terminate before the end if the end of test condition is reached, or you stop it manually.

List of compatible ergometers

Model	Type
COSMED Treadmill	COSMED/HP Cosmos treadmills, all models
COSMED Bike	COSMED/Ergoline bikes, all models
C-Safe bike	Technogym Excite bikes (only Bike Excite Med)
C-Safe Treadmill	Technogym Excite treadmills (only Run Excite Med)
Excal. Sport Dev1	Lode Excalibur Sport bike (set as device #1)
Marquette T2000	Marquette T2000 treadmill
Trackmaster (mph)	Trackmaster treadmills (speed set to mph)
Trackmaster (Kph)	Trackmaster treadmills (speed set to Kph)
Woodway	Woodway Treadmills
Monark	Monark Bikes

Warning: COSMED tested compatibility between Fitmate and the ergometers included in the above list. Interfacing Fitmate with other ergometers can be dangerous. The safety in connecting Fitmate and ergometers depends on many parameters, e.g. the protocol, the connectors, the ergometer software version.

Cosmed does not support customers for connecting ergometers not included in the above list and does not assume any liability for damages caused by (i) erroneous connections, (ii) use of not original cables/accessories, (iii) connection with ergometers not included in the above list or (iv) other unauthorized operation.

Important note: Software and hardware changes made by ergometer manufacturers aimed at device improvement and legislative changes can make the above list not trustworthy. Therefore, the above list is only reported just as an indication. COSMED guarantees compatibility only with ergometers purchased at COSMED together with the Fitmate. COSMED does not assume responsibility for incompatibility with an ergometer (even if included in the above list) if it is purchased by the customer independently from Fitmate.

Integration with GE Cardiosoft (Fitmate Pro/Med only)

Starting from 2.0 PC software release, Fitmate software can be synchronized with GE Cardiosoft ECG.

Fitmate Pro/Med can :

1. be automatically driven by the Cardiosoft protocol (Start, Exercise, Recovery phases) except than the Stop function (see later, *End of the test*).
2. Heart Rate, Blood Pressure, Speed, Grade, Power and protocol Phase are automatically transferred to the Fitmate.

Note: it is mandatory that the ergometer (cycle or treadmill) is controlled by the Ecg

► Enabling Cardiosoft for the communication with a Metabolic Cart

The screenshot shows the 'System Configuration' dialog box with the 'Devices' tab selected. The 'Metabolic Cart' checkbox is checked and circled in red. The 'Port' dropdown for the Metabolic Cart is also circled in red and set to 'COM 2'. Other settings include Treadmill Model: Internal Treadmill, Port: COM 1, Ergometer Model: internal, Port: COM 1, BP Monitor: no, Port: COM 1, SpO2 Monitor: no, Port: COM 2, Ambulatory Blood Pressure: no, Ambulatory BP Device Port: COM 2, Spirometry Device Type: no, Spirometry Device Port: COM 2. There are buttons for 'Print', 'Help', 'OK', and 'Cancel'.

To enable the communication between Cardiosoft and Fitmate it is necessary to specify in *System Configuration* -> *Devices* the option "**Metabolic Cart**" and the corresponding COM port where the cable is connected.

► Interface Cable

A null modem DB9F-DB9F cable is required (Cosmed code: C01353-01-12).

► Fitmate configuration

When starting the Cardiorespiratory fitness test, specify in the list of available ergometers **Case GE bike** if you are going to use a bike, or **Case GE Treadmill** if you are going to use a Treadmill.

► End of the test

End test is not automatically activated by the Cardiosoft, therefore "STOP TEST" must be manually pressed on the Fitmate.

Technical specs

► Sensors

Oxygen

Type: Galvanic Fuel cell
Range: 0-25% (Optimized for RMR test)
Accuracy: 1 mBar O₂ (circa 0.03% O₂ @ 760 mmHg PB)
Resolution: 0.006 % Vol O₂

Flow and volume (flowmeter RMR 18 mm)

Range: 0-50 L/min
Accuracy: <2%
Resolution: <10 ml

Flow and volume (flowmeter VO₂max 28 mm)

Range: 5-300L/min
Accuracy: <2%
Resolution: 24 ml

Barometric pressure

Type: piezo-resistive
Range: 300-800 mmHg
Accuracy: +/- 1 mmHg

► Power supply

Old models (till S/N XXXXXX0999)

4 NiMH rechargeable batteries 1.2 Volts, 4500 mAh

New models (from S/N XXXXXX1000)

Li-Ion rechargeable battery 7.4 Volts, 2150 mAh

Battery charger

Medical grade Battery charger/power supply
Friwo FM7555M/12
In: 100-240Vac, 50-60Hz, 400mA
Out: 12Vdc, 1.25 A

► Autonomy

Old models (till S/N XXXXXX0999)

Mean battery autonomy (stand-by): 5h 30m with low backlighted display, 4h 15m with high backlighted display
Mean printouts starting with completely charged battery: approx. 180 (in 1h 20m), about 20 each paper roll.
Mean battery autonomy (normal use) (stand-by, tests and printouts): 3h 30m approx.

New models (from S/N XXXXXX1000)

Mean battery autonomy (stand-by): 7h 30m with low backlighted display, 6h with high backlighted display
Mean printouts starting with completely charged battery: approx. 250 (in 1h 50m), about 20 each paper roll.
Mean battery autonomy (normal use) (stand-by, tests and printouts): 5h approx. (4h with Canopy)

► Display

LCD 320x240 pixel at 16 colors backlighted

► Dimensions and weight

198x235x66 mm, 1.4 Kg

► Interface

USB (Type A) for PC communication

USB (Type B) for direct printing on external printer, or for ANT HR probe connection

RS232 for ergometer control during VO₂max test or PC connection

► Canopy

Backup batteries

4 AA alkaline batteries (not rechargeable)

Dimensions and weight

Unit: 150x90x28 mm, 170g (without batteries)

Blower: 128x55 mm, 150g

Hood: 48x32x21 cm, 0.5 kg

Vail: 120x140 cm, 1 kg

Spare parts

► Consumables

C02580-01-05	RMR disposable masks (50 pcs)
A-196-056-001	Thermal paper (10 pcs)
C02748-01-11	O ₂ replacement kit (sensor and sampling line with filter)
C02807-01-08	Sampling line (Permapure) Fitmate
A-182-300-004	Antibacterial filters (50 pcs)
C00568-01-98	Soft PTE mouthpiece (200 pcs)
C00441-01-98	Nose clips (5 pcs)
C01805-01-98	Adult paper mouthpieces (500 pcs)
C01814-01-98	Paediatric paper mouthpieces (500 pcs)

► Cables

A-362-300-005	Serial cable Fitmate for PC communication
A-362-300-006	USB cable 1.8 m
A-362-300-006	Ergometer serial cable adapter
C02964-01-12	Ergometer communication cable (Technogym Excite)
C01713-01-12	Ergometer communication cable (Cosmed/Ergoline)
C01714-01-12	Ergometer communication cable (Cosmed/HP Cosmos)
A-362-315-004	USB cable mini-B for Lifecorder Plus

► Heart rate parts

A-661-200-001	Polar heart rate elastic belt
A-661-200-002	Polar heart rate transmitter
C02636-01-06	Polar HR probe
A-661-200-040	Heart rate monitor Dynastream (elastic belt with tx)
A-661-200-039	USB heart rate receiver stick Dynastream

► Calibration parts

C00600-01-11	3-litres calibration syringe
C00311-01-20	Silicone tube for calibration syringe

► Flowmeters

C02500-01-04	RMR Flowmeter
C02560-01-04	VO ₂ max Flowmeter

► Masks

C03611-01-10	Face mask for VO ₂ max Small
C03612-01-10	Face mask for VO ₂ max Medium
C03613-01-10	Face mask for VO ₂ max Large
A-800-900-023	Head cap (S, M)
A-800-900-022	Head cap (Large)

► Canopy

C03886-01-10	Veil
C03880-02-10	Hood
C02235-01-05	Turbine

► Miscellaneous

C00214-01-20	Paediatric mouthpiece adapter
A-661-115-001	Lifecorder Plus
C02383-01-05	Medical grade battery charger with European plug
A-497-900-002	Australian plug for battery charger
A-497-900-003	European plug for battery charger
A-497-900-004	USA plug for battery charger
A-497-900-005	UK plug for battery charger
A-662-150-001	Skinfold caliper
C02522-01-20	O ₂ sensor removal tool
C01900-01-08	Carrying case (Fitmate)
C01900-02-08	Carrying case (Fitmate Pro)
C01900-03-08	Carrying case (Fitmate Med)
A-662-150-001	Tape meter
A-661-110-001	Pedometer

References

COSMED made reference to the following textbooks:

Fitness assessment

ACSM's Guidelines for Exercise Testing and Prescription-Seventh edition (2005)

Frankenfield DC, et al. The Harris-Benedict studies of human basal metabolism: history and limitations. J Am Diet Assoc. 1998;98:439-445

Sixth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure, NIH publication, 1997

Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: National Institute of health. National Heart, Lung, and Blood Institute

Spirometry

ATS/ERS TASK FORCE: STANDARDISATION OF LUNG FUNCTION TESTING, Edited by V. Brusasco, R. Crapo and G. Viegi: Standardisation of spirometry, Eur Respir J 2005; 26: 319–338

Lung function", J.E. Cotes, Blackwell scientific publications

"Guidelines for Clinical Exercises Testing Laboratories", I.L. Pina, G.J. Balady, P. Hanson, A.J. Labovitz, D.W. Madonna, J. Myers. American Heart Association. 1995; 91, 912.

Cardiopulmonary exercise testing (VO₂max)

Principles of exercise testing and interpretation, 2nd edition"; Wasserman et Al, 1994

ATS/ACCP Statement on Cardiopulmonary Exercise Testing, Am J Respir Crit Care Med Vol 167. pp 211–277, 2003

ACC/AHA 2002 Guideline Update for Exercise Testing, Gibbons *et al.* 2002, ACC/AHA Practice Guidelines

Indirect calorimetry

Energy Expenditure and Fuel Selection in Biological Systems: The Theory and Practice of Calculations Based on Indirect Calorimetry and Tracer Methods": M. Elia, G. Livesey, World Rev. Nutr. Diet. Basel, Karger, 1992, vol 70, pp 68-131

Nutritional Assessment in Critical Care, A Training Handbook": Donald C. Zavala

Sub-maximal test

Cardiorespiratory Assessment of Apparently Healthy Populations", Timothy R. McConnell, in ACSM's Resource Manual for Guidelines for Exercise Testing and Prescription, 4th Edition, pp. 361-366

Franklin BA, ed. ACSM's Guidelines for Exercise Testing and Prescription, 6th Edition Philadelphia: Williams&Wilkins, 2000:22-29

Risk analysis

European Guidelines on CVD Prevention: Third Joint European Societies' Task Force on Cardiovascular Disease Prevention in Clinical Practice. De Becker G., Ambrosini E., Barch-Johnsen K., et al. Eur. J. Cardiovasc. Prev. Rehabil. 2003, 10 (Suppl 1): S1-S78.

AHA/ACC Scientific Statement: Assessment of Cardiovascular Risk by Use of Multiple-Risk-Factor Assessment Equations : A Statement for Healthcare Professionals From the American Heart Association and the American College of Cardiology. Scott M. Grundy, Richard Pasternak, Philip Greenland, Sidney Smith, Jr, and Valentin Fuster Circulation 1999 100: 1481 – 1492.

Frammingham Study: Wilson PW, D'Agostino RB, Levy D, Belanger AM, Silbershatz H, Kannel WB. Prediction of coronary heart disease using risk factor categories. *Circulation*. 1998;97:1837–1847.

DeLong, Frank E. Harrell, Jr, Lawrence H. Muhlbaier and Daniel B. Mark Leslee J. Shaw, Eric D. Peterson, Linda K. Shaw, Karen L. Kesler, Elizabeth R. *Use of a Prognostic Treadmill Score in Identifying Diagnostic Coronary Disease*. 1998;98;1622-1630 Circulation

Celli BR, Cote CG, et al. The Body-Mass Index, Airflow Obstruction, Dyspnoea, and Exercise Capacity Index in Chronic Obstructive Pulmonary Disease. N Engl J Med. 2004; 350: 1005-1012.

Canopy

Energy Expenditure and Fuel Selection in Biological Systems: The Theory and Practice of Calculations Based on Indirect Calorimetry and Tracer Methods; M. Elia, G. Livesey, World Rev. Nutr. Diet. Basel, Karger, 1992, vol 70, pp 68-131.

Nutritional assessment in Critical Care, a training handbook; Donald C. Zavala

Oximeter

National Lung Health Education Program (NLHEP) - Guide to prescribing Home Oxygen. By Thomas L. Petty.

ERJ 2004, 23: 932-646 - ATS/ERS Task force, B. R. Celli, W. MacNee, committee members - Standard for the diagnosis and treatment of patients with COPD: A summary of the ATS/ERS position paper.

